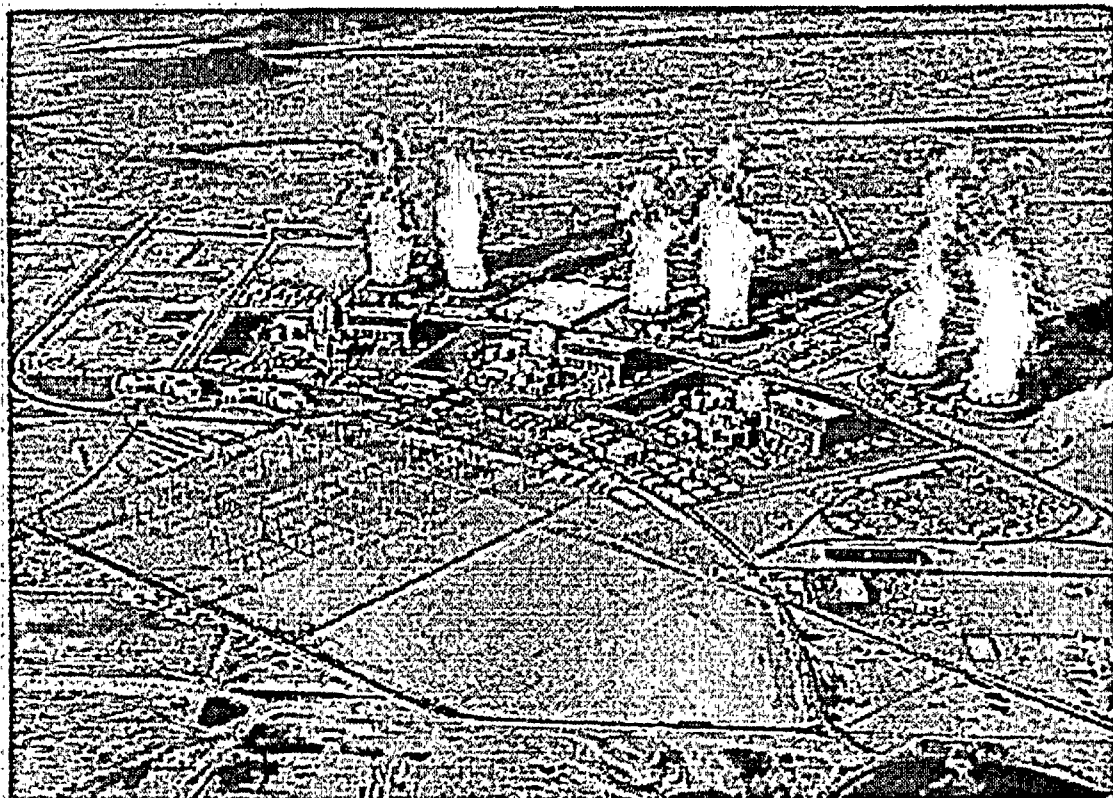


PALO VERDE NUCLEAR GENERATING STATION
UNITS 1, 2 AND 3

1998

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

USNRC Docket No. STN 50-528/529/530
RCTS 010763



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INTRODUCTION

This report summarizes effluent and waste disposal source term data, meteorological data and doses from radioactive effluents for the Palo Verde Nuclear Generating Station (PVNGS) for the period of January through December 1998. The data presented meets the reporting requirements of Regulatory Guide 1.21 (Revision 1, June 1974) of the U.S. Nuclear Regulatory Commission and the PVNGS Technical Specifications.



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APPENDIX A
SOURCE TERMS
AND
EFFLUENT AND WASTE DISPOSAL REPORTS

Supplemental Information

1.0 REGULATORY LIMITS

1.1 Liquid Releases

1.1.1 PVNGS ODCM Requirement 3.2

The concentration of radioactive material discharged from secondary system liquid waste to the circulating water system shall be limited to:

5.0E-07 $\mu\text{Ci/ml}$ for the principal gamma emitters (except Ce-144)

3.0E-06 $\mu\text{Ci/ml}$ for Ce-144

1.0E-06 $\mu\text{Ci/ml}$ for I-131.

1.0E-03 $\mu\text{Ci/ml}$ for H-3

The concentration of radioactive material discharged from secondary system liquid waste to the onsite evaporation ponds shall be limited to:

2.0E-06 $\mu\text{Ci/ml}$ for Cs-134

2.0E-06 $\mu\text{Ci/ml}$ for Cs-137

The concentrations specified in 10 CFR Part 20.1001-20.2401, Appendix B, Table 2, Column 2, for all other isotopes

1.1.2 PVNGS ODCM Requirement 4.4

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited:

- a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and
- b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.

1.2 Gaseous Releases

1.2.1 PVNGS ODCM Requirement 3.1

The dose rate due to radioactive materials released in gaseous effluents from the site shall be limited to the following:

- a. For noble gases: Less than or equal to 500 mrem/yr to the total body and less than or equal to 3000 mrem/yr to the skin, and
- b. For I-131 and I-133, for tritium, and for all radionuclides in particulate form with half-lives greater than 8 days: Less than or equal to 1500 mrem/yr to any organ.

1.2.2 PVNGS ODCM Requirement 4.1

The air dose due to noble gases released in gaseous effluents, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 5 mrad for gamma radiation and less than or equal to 10 mrad for beta radiation and,
- b. During any calendar year: Less than or equal to 10 mrad for gamma radiation and less than or equal to 20 mrad for beta radiation.

1.2.3 PVNGS ODCM Requirement 4.2

The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY shall be limited to the following:

- a. During any calendar quarter: Less than or equal to 7.5 mrem to any organ and,
- b. During any calendar year: Less than or equal to 15 mrem to any organ.

1.2.4 PVNGS ODCM Requirement 4.3

The GASEOUS RADWASTE SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent air doses due to gaseous effluent releases, from each reactor unit, from the site, when averaged over 31 days, would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation. The VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases, from each reactor unit, to areas at and beyond the SITE BOUNDARY when averaged over 31 days, would exceed 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

1.3 Total Dose

1.3.1 PVNGS ODCM Requirement 5.1

The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to direct radiation from uranium fuel cycle sources shall be limited to less than or equal to 25 mrem to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem.

2.0 MAXIMUM PERMISSIBLE CONCENTRATIONS

Air: Release Concentrations are limited to dose rate limits described in section 1.2.1 of this report.

3.0 AVERAGE ENERGY

The average energy (\bar{E}) of the radionuclide mixture in releases of fission and activation gases is not applicable to PVNGS.

4.0 MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY IN GASEOUS EFFLUENTS

For continuous releases, sampling is in accordance with PVNGS ODCM Table 3-1. Particulate and iodine radionuclides are sampled continuously at the Plant Vent and Fuel Building exhaust points. The particulate filters and charcoal cartridges are exchanged for analysis four times per month. Noble gas and tritium are sampled at least once per 31 days. The hourly average Radiation Monitoring System (RMS) effluent monitor readings are used, when available, to account for increases and decreases in noble gas concentrations between noble gas grab samples. The tritium concentration is assumed constant between sampling periods.

For batch releases, sampling is also in accordance with PVNGS ODCM Table 3-1. For containment purges, the noble gas concentration is adjusted to account for decreases or increases in concentration during the purge using RMS readings. The volume of air released during the purge is determined using the exhaust fan rated flow rate. For Waste Gas Decay Tank releases, the volume released is corrected to standard pressure.

The Lower Limit of Detection (LLD) of a measurement system is defined in Table 3-1 of the PVNGS ODCM. An average LLD for each radionuclide is provided in Table 3.

5.0 BATCH RELEASES

5.1 Gaseous.

Batch release durations are presented in Table 2.

5.2 Liquid

None.

6.0 ABNORMAL RELEASES

None.

7.0 OFFSITE DOSE CALCULATION MANUAL AND PROCESS CONTROL PROGRAM (PCP) REVISIONS

7.1 ODCM, Revision 13, was effective August 13, 1998, and is included in Appendix E.

7.2 There were revisions to the PCP. The revisions are included in Appendix F.

8.0 EFFLUENTS AND SOLID WASTES

8.1 Gaseous Effluents

Gaseous effluent information is presented in Table 1 through Table 41. Included in these tables are summaries of the effluents and estimated total error.

8.2 Liquid Effluents

There were no liquid effluent releases beyond the Site Boundary from PVNGS.

8.3 Solid Waste

Solid waste shipments are summarized in Table 42.

9.0 MISCELLANEOUS INFORMATION

9.1 EVAPORATION PONDS

Releases made to the Evaporation Ponds are limited to the concentrations specified in PVNGS ODCM Requirement 3.2. The Evaporation Ponds were monitored in accordance with PVNGS ODCM Requirement 6.1.

The average historical evaporation is approximately 12 inches, per pond, for each of the first and fourth quarters, and 33 inches, per pond, for each of the second and third quarters. This equates to $3.09\text{E}+11$ cc evaporated from Pond One for each of the first and fourth quarters and $8.50\text{E}+11$ cc evaporated from Pond One for each of the second and third quarters. The amount evaporated from Pond Two is $2.89\text{E}+11$ cc for each of the first and fourth quarters and $7.96\text{E}+11$ cc for each of the second and third quarters. Using a site boundary X/Q of $5.0\text{E}-05$ sec/ m^3 for the evaporation ponds and equation 4-3 from the ODCM, the dose from the evaporation ponds to a hypothetical individual at the site boundary, for all pathways, is summarized in Table 1.

9.2 RADIATION MONITORING SYSTEM SETPOINT VERIFICATION

Current effluent monitor noble gas channel alert alarm setpoints are based on an assumed one per cent failed fuel source term. The current setpoints are more conservative than setpoints calculated using the actual noble gas source term presented in Table 38.



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9.3 REPORT ADDENDUM

Technical Specification 6.9.1.5 (TRM 5.0.600.1) required that an annual report be submitted to the NRC to include the results of specific activity analysis in which the primary coolant exceeded the limits of Technical Specification 3.4.7 (ITS 3.4.17).

CRDR 980921 identified the condition where the annual reporting requirement for primary coolant specific activity in excess of the limits of Technical Specification 3.4.7 (ITS 3.4.17) was not performed pursuant to Technical Specification 6.9.1.5 (TRM 5.0.600.1). Review of Chemistry records from initial startup to the present for each Unit revealed that nine occurrences of reactor coolant system dose equivalent iodine (DEQI) greater than the Technical Specification limit were not reported to the NRC for the period covering 1986 to 1992. The Technical Specification limit has not been exceeded since September 1992. The required data is presented in Appendix D.

ODCM, section 7.1, requires changes to the PCP to be included in the ARERR. CRDR 981853 identified that changes to the PCP were not included in the 1997 ARERR. These changes are discussed in Appendix F.

10.0 DISCUSSION

10.1 Unit One

Unit One operated at 100% power with a refueling outage (U1R7) from March 14, 1998 to April 19, 1998.

10.2 Unit Two

Unit Two operated at 100% power for the year without a refueling outage.

10.3 Unit Three

Unit Three operated at 100% power with a refueling outage (U3R7) from September 19, 1998 to October 25, 1998.

10.4 General

PVNGS does not have a liquid release pathway. Removal of tritium is performed by operation of the Boric Acid Concentrator (BAC) in the release mode. Comparison of PVNGS annual tritium curies released to other utilities should be made only after summing both liquid and gaseous tritium curies released.

10.5 Summary

Dose for 1998 was primarily due to the release of tritium. Tritium production is approximately 1000 curies per Reactor Unit per year. In order to control plant tritium concentrations, tritium releases should match tritium production. For 1998 PVNGS released a total of 2180 curies of tritium.

Releases from Units 1 and 3 were higher than releases from Unit 2. This was due to refueling outages for Units 1 and 3. A majority of the Xe-133 and I-131 for Units 1 and 3 were released during containment purges associated with each Unit's outage.



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Table 1: Evaporation Pond Data					
Evaporation Pond 1	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
Historical volume of water evaporated (ml)	3.09E+11	8.50E+11	8.50E+11	3.09E+11	
Tritium Concentration (uCi/cc)	1.53E-06	1.05E-06	9.29E-07	7.38E-07	
Tritium Curies	4.73E-01	8.93E-01	7.90E-01	2.28E-01	2.38E+00
Evaporation Pond 2	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
Historical volume of water evaporated (ml)	2.89E+11	7.96E+11	7.96E+11	2.89E+11	
Tritium Concentration (uCi/cc)	1.14E-06	7.13E-07	1.06E-06	8.45E-07	
Tritium curies	3.29E-01	5.68E-01	8.44E-01	2.44E-01	1.99E+00
Dose (mRem)	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year
Pond 1	6.65E-03	1.26E-02	1.11E-02	3.21E-03	3.35E-02
Pond 2	4.63E-03	7.99E-03	1.19E-02	3.43E-03	2.80E-02
Total	1.13E-02	2.05E-02	2.30E-02	6.64E-03	6.14E-02

Table 2: Batch Release Data			
All times are in hours	Unit 1	Unit 2	Unit 3
January - June			
Number of batch releases	50	30	27
Total time period for batch releases	2090.45	641.62	1012.27
Maximum time period for a batch release	168.00	166.00	168.00
Average time period for a batch release	41.81	21.39	37.49
Minimum time period for a batch release	1.07	0.64	0.62
July - December			
Number of batch releases	44	30	38
Total time period for batch releases	760.65	375.06	1851.91
Maximum time period for a batch release	167.34	166.75	168.00
Average time period for a batch release	16.83	12.50	48.73
Minimum time period for a batch release	1.05	1.29	0.12
January - December			
Number of batch releases	94	60	65
Total time period for batch releases	2831.10	1016.67	2864.19
Maximum time period for a batch release	168.00	166.75	168.00
Average time period for a batch release	30.12	16.94	44.06
Minimum time period for a batch release	1.05	0.64	0.12

**Table 3:
Units 1, 2 & 3
Gaseous Effluents Average Lower Limit Of Detection**

$\mu\text{Ci/cc}$					
Nuclide	Continuous	Batch	Nuclide	Continuous	Batch
Antimony-122	2.20E-13	1.90E-11	Argon-41	4.50E-08	4.50E-08
Antimony-124	8.40E-14	1.70E-11	Krypton-85	7.40E-06	7.40E-06
Barium-140	3.40E-13	5.70E-11	Krypton-85m	2.20E-08	2.20E-08
Bromine-82	3.30E-13	1.40E-11	Krypton-87	5.70E-08	5.70E-08
Cerium-141	8.70E-14	3.10E-11	Krypton-88	7.40E-08	7.40E-08
Cerium-144	3.60E-13	6.50E-11	Xenon-125	2.20E-08	2.20E-08
Cesium-134	1.00E-13	2.60E-11	Xenon-127	2.10E-08	2.10E-08
Cesium-137	8.10E-14	1.70E-11	Xenon-131m	9.10E-07	9.10E-07
Cesium-138	5.20E-10	7.30E-10	Xenon-133	6.30E-08	6.30E-08
Chromium-51	6.90E-13	1.40E-10	Xenon-133m	1.90E-07	1.90E-07
Cobalt-58	8.50E-14	1.70E-11	Xenon-135	2.00E-08	2.00E-08
Cobalt-60	1.00E-13	1.90E-11	Xenon-135m	8.90E-08	8.90E-08
Iron-59	1.70E-13	3.20E-11	Xenon-138	2.00E-07	2.00E-07
Lanthanum-140	2.80E-13	2.10E-11	Iodine-131	8.00E-14	7.00E-12
Manganese-54	8.30E-14	1.70E-11	Iodine-132	6.60E-12	1.90E-11
Molybdenum-99	2.40E-13	2.80E-11	Iodine-133	4.70E-13	1.10E-11
Niobium-95	8.70E-14	1.80E-11	Iodine-134	5.90E-11	8.20E-11
Rubidium-88	1.90E-08	1.90E-08	Iodine-135	7.00E-12	5.50E-11
Ruthenium-103	7.40E-14	1.50E-11			
Strontium-89	2.15E-15	(1)			
Strontium-90	5.60E-16	(1)			
Tellurium-123m	6.60E-14	1.50E-11			
Tritium	3.80E-07	3.80E-07			
Zinc-65	1.90E-13	3.80E-11			
Zirconium-95	1.80E-13	4.10E-11			
Gross Alpha	3.60E-15	(1)			
(1) Not required for batch releases.					

**Table 4:
Unit 1
Gaseous Effluents - Summation Of All Releases**

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total For Year	Est. Total Error % (1)
A. Fission & activation gases							
1. Total release	Ci	7.01E+01	3.27E+01	1.74E-01	4.77E-01	1.03E+02	3.54E+01
2. Average release rate for period	μCi/sec	9.01E+00	4.16E+00	2.19E-02	6.00E-02	3.27E+00	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
B. Iodine 131							
1. Total Iodine 131	Ci	1.53E-03	7.24E-05	< LLD	4.26E-06	1.61E-03	3.32E+01
2. Average release rate for period	μCi/sec	1.97E-04	9.21E-06	< LLD	5.36E-07	5.11E-05	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
C. Particulates							
1. Particulates with half- lives > 8 days	Ci	7.17E-03	5.98E-05	8.41E-06	< LLD	7.23E-03	3.43E+01
2. Average release rate for period	μCi/sec	9.22E-04	7.61E-06	1.06E-06	< LLD	2.29E-04	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
4. Gross Alpha radioactivity	Ci	< LLD	< LLD	< LLD	< LLD	< LLD	
D. Tritium							
1. Total release	Ci	2.13E+02	1.30E+02	1.12E+02	1.21E+02	5.76E+02	3.85E+01
2. Average release rate for period	μCi/sec	2.74E+01	1.65E+01	1.40E+01	1.53E+01	1.83E+01	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
(1) Estimated total error methodology is presented in Table 40.							
(2) See Table 11 for percent of ODCM Requirement limits.							



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Table 5: Unit 1 Gaseous Effluents - Ground Level Releases - Continuous - Fission Gases and Iodines						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Ar-41	Ci	<LLD	8.75E-01	<LLD	<LLD	8.75E-01
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	2.10E+01	2.14E+01	<LLD	<LLD	4.24E+01
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	1.40E+01	3.40E-01	<LLD	<LLD	1.44E+01
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	3.50E+01	2.26E+01	<LLD	<LLD	5.76E+01
2. Iodines						
I-131	Ci	3.30E-04	7.24E-05	<LLD	4.26E-06	4.07E-04
I-132	Ci	8.85E-04	<LLD	<LLD	<LLD	8.85E-04
I-133	Ci	4.23E-05	1.28E-05	<LLD	<LLD	5.52E-05
total	Ci	1.26E-03	8.52E-05	<LLD	4.26E-06	1.35E-03

<p align="center">Table 6: Unit 1 Gaseous Effluents - Ground Level Releases - Continuous - Particulates</p>						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3.Particulates						
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Br-82	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	4.06E-05	3.02E-05	<LLD	<LLD	7.09E-05
Co-60	Ci	7.86E-07	5.35E-06	7.93E-06	<LLD	1.41E-05
Cr-51	Ci	4.31E-06	<LLD	<LLD	<LLD	4.31E-06
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	3.01E-06	<LLD	<LLD	3.01E-06
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	1.76E-06	<LLD	<LLD	<LLD	1.76E-06
Os-191	Ci	3.65E-05	1.96E-05	<LLD	<LLD	5.61E-05
Ru-103	Ci	1.53E-06	7.47E-07	<LLD	<LLD	2.27E-06
Ru-106	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sb-124	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Se-75	Ci	<LLD	7.34E-07	<LLD	<LLD	7.34E-07
Sr-89	Ci	<LLD	<LLD	4.70E-07	<LLD	4.70E-07
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Te-123m	Ci	3.08E-07	<LLD	<LLD	<LLD	3.08E-07
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	8.58E-05	5.96E-05	8.41E-06	<LLD	1.54E-04
4.Tritium						
H-3	Ci	1.80E+01	2.13E+01	2.76E+01	3.81E+01	1.05E+02

<p align="center">Table 7: Unit 1 Gaseous Effluents - Ground Level Releases - Batch - Fission Gases and Iodines</p>						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Ar-41	Ci	2.54E-01	1.44E-01	1.33E-01	2.72E-01	8.03E-01
Kr-85	Ci	6.55E-01	5.57E-01	< LLD	< LLD	1.21E+00
Kr-85m	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Kr-87	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Kr-88	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Xe-131m	Ci	1.57E-01	5.86E+00	< LLD	< LLD	6.01E+00
Xe-133	Ci	3.33E+01	3.52E+00	4.01E-02	2.00E-01	3.71E+01
Xe-133m	Ci	5.47E-01	2.08E-03	< LLD	< LLD	5.49E-01
Xe-135	Ci	1.86E-01	1.16E-04	1.09E-03	4.43E-03	1.92E-01
Xe-135m	Ci	1.57E-01	5.86E+00	< LLD	< LLD	6.01E+00
Xe-138	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
total	Ci	3.51E+01	1.01E+01	1.74E-01	4.77E-01	4.58E+01
2. Iodines						
I-131	Ci	1.20E-03	4.75E-08	< LLD	< LLD	1.20E-03
I-132	Ci	5.00E-02	< LLD	< LLD	< LLD	5.00E-02
I-133	Ci	6.37E-05	1.58E-07	< LLD	< LLD	6.39E-05
total	Ci	5.13E-02	2.06E-07	< LLD	< LLD	5.13E-02



<p align="center">Table 8: Unit 1 Gaseous Effluents - Ground Level Releases - Batch - Particulates</p>						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3. Particulates						
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Br-82	Ci	3.47E-05	1.27E-05	1.00E-05	2.67E-05	8.40E-05
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	9.05E-04	1.83E-07	<LLD	<LLD	9.05E-04
Co-60	Ci	1.83E-05	<LLD	<LLD	<LLD	1.83E-05
Cr-51	Ci	1.91E-05	<LLD	<LLD	<LLD	1.91E-05
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	5.99E-06	<LLD	<LLD	<LLD	5.99E-06
La-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	1.05E-05	<LLD	<LLD	<LLD	1.05E-05
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	2.25E-05	<LLD	<LLD	<LLD	2.25E-05
Os-191	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ru-103	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ru-106	Ci	6.08E-03	<LLD	<LLD	<LLD	6.08E-03
Sb-124	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Se-75	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	Note 1	Note 1	Note 1	Note 1	Note 1
Sr-90	Ci	Note 1	Note 1	Note 1	Note 1	Note 1
Te-123m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	1.98E-05	<LLD	<LLD	<LLD	1.98E-05
total	Ci	7.12E-03	1.28E-05	1.00E-05	2.67E-05	7.16E-03
4. Tritium						
H-3	Ci	1.95E+02	1.08E+02	8.39E+01	8.32E+01	4.71E+02
Note 1 - Not required for batch releases						

Table 9: Unit 1 Gaseous Effluents - Continuous and Batch - Fission Gases and Iodines						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Ar-41	Ci	2.54E-01	1.02E+00	1.33E-01	2.72E-01	1.68E+00
Kr-85	Ci	6.55E-01	5.57E-01	< LLD	< LLD	1.21E+00
Xe-131m	Ci	1.57E-01	5.86E+00	< LLD	< LLD	6.01E+00
Xe-133	Ci	5.43E+01	2.49E+01	4.01E-02	2.00E-01	7.94E+01
Xe-133m	Ci	5.47E-01	2.08E-03	< LLD	< LLD	5.49E-01
Xe-135	Ci	1.42E+01	3.40E-01	1.09E-03	4.43E-03	1.46E+01
total	Ci	7.01E+01	3.27E+01	1.74E-01	4.77E-01	1.03E+02
2. Iodines						
I-131	Ci	1.53E-03	7.24E-05	< LLD	4.26E-06	1.61E-03
I-132	Ci	5.09E-02	< LLD	< LLD	< LLD	5.09E-02
I-133	Ci	1.06E-04	1.30E-05	< LLD	< LLD	1.19E-04
total	Ci	5.26E-02	8.54E-05	< LLD	4.26E-06	5.27E-02

<p align="center">Table 10: Unit 1 Gaseous Effluents - Continuous and Batch - Particulates</p>						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3. Particulates						
Br-82	Ci	3.47E-05	1.27E-05	1.00E-05	2.67E-05	8.40E-05
Co-58	Ci	9.46E-04	3.04E-05	< LLD	< LLD	9.76E-04
Co-60	Ci	1.90E-05	5.35E-06	7.93E-06	< LLD	3.23E-05
Cr-51	Ci	2.34E-05	< LLD	< LLD	< LLD	2.34E-05
Cs-137	Ci	< LLD	3.01E-06	< LLD	< LLD	3.01E-06
Fe-59	Ci	5.99E-06	< LLD	< LLD	< LLD	5.99E-06
Mn-54	Ci	1.05E-05	< LLD	< LLD	< LLD	1.05E-05
Nb-95	Ci	2.43E-05	< LLD	< LLD	< LLD	2.43E-05
Os-191	Ci	3.65E-05	1.96E-05	< LLD	< LLD	5.61E-05
Ru-103	Ci	1.53E-06	7.47E-07	< LLD	< LLD	2.27E-06
Ru-106	Ci	6.08E-03	< LLD	< LLD	< LLD	6.08E-03
Se-75	Ci	< LLD	7.34E-07	< LLD	< LLD	7.34E-07
Sr-89	cI	< LLD	< LLD	4.70E-07	< LLD	4.70E-07
Te-123m	Ci	3.08E-07	< LLD	< LLD	< LLD	3.08E-07
Zr-95		1.98E-05	< LLD	< LLD	< LLD	1.98E-05
total	Ci	7.20E-03	7.25E-05	1.85E-05	2.67E-05	7.32E-03
total > 8 days	Ci	7.17E-03	5.98E-05	8.41E-06	< LLD	7.23E-03
4. Tritium						
H-3	Ci	2.13E+02	1.30E+02	1.12E+02	1.21E+02	5.76E+02

Table 11: Unit 1 Radiation Doses At And Beyond The Site Boundary						
	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
Gamma Air Dose	mrad	1.38E-02	5.61E-03	3.54E-04	7.37E-04	2.05E-02
ODCM Req 4.1 Limit	mrad	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
% ODCM Limit	%	2.77E-01	1.12E-01	7.08E-03	1.47E-02	2.05E-01
Beta Air Dose	mrad	2.68E-02	1.07E-02	1.36E-04	3.14E-04	3.80E-02
ODCM Req 4.1 Limit	mrad	1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
% ODCM Limit	%	2.68E-01	1.07E-01	1.36E-03	3.14E-03	1.90E-01
Maximum Organ Dose (excluding skin)	mrem	9.80E-02	4.74E-02	4.00E-02	4.36E-02	2.27E-01
Age		Child	Teen	Teen	Teen	Teen
Organ		Thyroid	Thyroid	Lung	Thyroid	Thyroid
ODCM Req. 4.2 Limit	mrem	7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
% ODCM Limit	%	1.31E+00	6.32E-01	5.34E-01	5.81E-01	1.51E+00

Calculations are based on parameters and methodologies of the ODCM using historical meteorology. Dose is calculated to a hypothetical individual. In contrast, Appendix C dose calculations are based on concurrent meteorology, a real individual, and only the actual pathways present.



Table 12:
Unit 2

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total For Year	Est. Total Error % (1)
A. Fission & activation gases							
1. Total release	Ci	8.43E-02	4.01E+00	1.38E-01	1.48E-01	4.38E+00	3.54E+01
2. Average release rate for period	μCi/sec	1.08E-02	5.09E-01	1.74E-02	1.86E-02	1.39E-01	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
B. Iodine 131							
1. Total Iodine 131	Ci	< LLD	< LLD	< LLD	< LLD	< LLD	3.32E+01
2. Average release rate for period	μCi/sec	< LLD	< LLD	< LLD	< LLD	< LLD	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
C. Particulates							
1. Particulates with half- lives > 8 days	Ci	< LLD	< LLD	< LLD	4.13E-07	4.13E-07	3.43E+01
2. Average release rate for period	μCi/sec	< LLD	< LLD	< LLD	5.20E-08	1.31E-08	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
4. Gross Alpha radioactivity	Ci	< LLD	< LLD	< LLD	< LLD	< LLD	
D. Tritium							
1. Total release	Ci	8.29E+01	6.83E+01	1.90E+01	2.71E+02	4.42E+02	3.85E+01
2. Average release rate for period	μCi/sec	1.07E+01	8.68E+00	2.39E+00	3.41E+01	1.40E+01	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
(1) Estimated total error methodology is presented in Table 40.							
(2) See Table 19 for percent of ODCM Requirement limits.							

Table 13: Unit 2 Gaseous Effluents - Ground Level Releases - Continuous - Fission Gases and Iodines						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Argon-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	1.39E+00	<LLD	<LLD	1.39E+00
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	2.50E+00	<LLD	<LLD	2.50E+00
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	<LLD	3.88E+00	<LLD	<LLD	3.88E+00
2. Iodines						
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	<LLD	<LLD	<LLD	<LLD	<LLD

Table 14: Unit 2 Gaseous Effluents - Ground Level Releases - Continuous - Particulates						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3. Particulates						
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Br-82	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Os-191	Ci	<LLD	<LLD	<LLD	4.13E-07	4.13E-07
Ru-103	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Ru-106	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sb-124	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Se-75	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Te-123m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	<LLD	<LLD	<LLD	4.13E-07	4.13E-07
4. Tritium						
H-3	Ci	2.81E+01	1.94E+01	1.90E+01	3.64E+00	7.01E+01

Table 15: Unit 2 Gaseous Effluents - Ground Level Releases - Batch - Fission Gases and Iodines						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Ar-41	Ci	8.14E-02	1.17E-01	1.33E-01	1.44E-01	4.75E-01
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	2.87E-03	4.13E-03	5.33E-03	3.93E-03	1.63E-02
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	8.43E-02	1.21E-01	1.38E-01	1.48E-01	4.92E-01
2. Iodines						
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	<LLD	<LLD	<LLD	<LLD	<LLD

Table 16: Unit 2 Gaseous Effluents - Ground Level Releases - Batch - Particulates						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3. Particulates						
Ba-140	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Br-82	Ci	6.08E-06	8.55E-06	1.02E-05	1.04E-05	3.53E-05
Ce-141	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ce-144	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Co-58	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Co-60	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Cr-51	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Cs-134	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Cs-137	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Fe-59	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
La-140	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Mn-54	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Mo-99	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Nb-95	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Os-191	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ru-103	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ru-106	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Sb-124	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Se-75	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Sr-89	Ci	Note 1	Note 1	Note 1	Note 1	Note 1
Sr-90	Ci	Note 1	Note 1	Note 1	Note 1	Note 1
Te-123m	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Zn-65	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Zr-95	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
total	Ci	6.08E-06	8.55E-06	1.02E-05	1.04E-05	3.53E-05
4. Tritium						
H-3	Ci	5.49E+01	4.88E+01	4.66E-02	2.68E+02	3.71E+02
Note 1 - Not required for batch releases						

Table 17: Unit 2 Gaseous Effluents - Continuous and Batch - Fission Gases and Iodines						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Ar-41	Ci	8.14E-02	1.17E-01	1.33E-01	1.44E-01	4.75E-01
Xe-133	Ci	2.87E-03	1.39E+00	5.33E-03	3.93E-03	1.40E+00
Xe-135	Ci	< LLD	2.50E+00	< LLD	< LLD	2.50E+00
total	Ci	8.43E-02	4.01E+00	1.38E-01	1.48E-01	4.38E+00
2. Iodines						
I-131	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
total	Ci	< LLD	< LLD	< LLD	< LLD	< LLD

Table 18: Unit 2 Gaseous Effluents - Continuous and Batch - Particulates						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3. Particulates						
Br-82	Ci	6.08E-06	8.55E-06	1.02E-05	1.04E-05	3.53E-05
Os-191	Ci	< LLD	< LLD	< LLD	4.13E-07	4.13E-07
total	Ci	6.08E-06	8.55E-06	1.02E-05	1.08E-05	3.57E-05
total >8 days	Ci	< LLD	< LLD	< LLD	4.13E-07	4.13E-07
4. Tritium						
H-3	Ci	8.29E+01	6.83E+01	1.90E+01	2.71E+02	4.42E+02

Table 19: Unit 2 Radiation Doses At And Beyond The Site Boundary						
	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
Gamma Air Dose	mrad	2.14E-04	1.80E-03	3.50E-04	3.79E-04	2.74E-03
ODCM Req 4.1 Limit	mrad	5.00E+00	5.00E+00	5.00E+00	5.00E+00	1.00E+01
% ODCM Limit	%	4.28E-03	3.60E-02	6.99E-03	7.59E-03	2.74E-02
Beta Air Dose	mrad	7.63E-05	2.26E-03	1.25E-04	1.35E-04	2.59E-03
ODCM Req 4.1 Limit	mrad	1.00E+01	1.00E+01	1.00E+01	1.00E+01	2.00E+01
% ODCM Limit	%	7.63E-04	2.26E-02	1.25E-03	1.35E-03	1.30E-02
Maximum Organ Dose (excluding skin)	mrem	2.97E-02	2.45E-02	6.82E-03	9.73E-02	1.58E-01
Age		Teen	Teen	Teen	Teen	Teen
Organ		Thyroid	Thyroid	Thyroid	Thyroid	Thyroid
ODCM Req. 4.2 Limit	mrem	7.50E+00	7.50E+00	7.50E+00	7.50E+00	1.50E+01
% ODCM Limit	%	3.97E-01	3.27E-01	9.09E-02	1.30E+00	1.06E+00

Calculations are based on parameters and methodologies of the ODCM using historical meteorology. Dose is calculated to a hypothetical individual. In contrast, Appendix C dose calculations are based on concurrent meteorology, a real individual, and only the actual pathways present.

Table 20:
Unit 3
Gaseous Effluents - Summation Of All Releases

	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total For Year	Est. Total Error % (1)
A. Fission & activation gases							
1. Total release	Ci	1.51E-01	1.15E-01	3.03E+01	8.77E-01	3.15E+01	3.54E+01
2. Average release rate for period	μCi/sec	1.95E-02	1.47E-02	3.82E+00	1.10E-01	9.99E-01	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
B. Iodine 131							
1. Total Iodine 131	Ci	< LLD	< LLD	1.67E-03	2.23E-03	3.90E-03	3.32E+01
2. Average release rate for period	μCi/sec	< LLD	< LLD	2.10E-04	2.81E-04	1.24E-04	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
C. Particulates							
1. Particulates with half- lives > 8 days	Ci	< LLD	2.15E-06	1.32E-04	7.79E-04	9.13E-04	3.43E+01
2. Average release rate for period	μCi/sec	< LLD	2.73E-07	1.66E-05	9.80E-05	2.90E-05	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
4. Gross Alpha radioactivity	Ci	< LLD	< LLD	< LLD	< LLD	< LLD	
D. Tritium							
1. Total release	Ci	2.64E+02	2.93E+02	4.88E+02	1.14E+02	1.16E+03	3.85E+01
2. Average release rate for period	μCi/sec	3.40E+01	3.72E+01	6.14E+01	1.43E+01	3.68E+01	
3. Percent of ODCM Requirement limit	%	NA (2)	NA (2)	NA (2)	NA (2)	NA (2)	
(1) Estimated total error methodology is presented in Table 40.							
(2) See Table 27 for percent of ODCM Requirement limits.							

<p align="center">Table 21: Unit 3 Gaseous Effluents - Ground Level Releases - Continuous - Fission Gases and Iodines</p>						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-131m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	5.06E+00	<LLD	5.06E+00
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD
total	Ci	<LLD	<LLD	5.06E+00	<LLD	5.06E+00
2. Iodines						
I-131	Ci	<LLD	<LLD	5.23E-04	2.80E-04	8.03E-04
I-132	Ci	<LLD	<LLD	2.32E-03	1.87E-04	2.51E-03
I-133	Ci	<LLD	<LLD	4.43E-05	<LLD	4.43E-05
total	Ci	<LLD	<LLD	2.89E-03	4.67E-04	3.35E-03

Table 22: Unit 3 Gaseous Effluents - Ground Level Releases - Continuous - Particulates						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3. Particulates						
Ba-140	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Br-82	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ce-141	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ce-144	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Co-58	Ci	< LLD	< LLD	5.36E-05	1.86E-04	2.40E-04
Co-60	Ci	< LLD	< LLD	5.46E-06	2.71E-05	3.26E-05
Cr-51	Ci	< LLD	< LLD	4.07E-05	1.10E-04	1.51E-04
Cs-134	Ci	< LLD	< LLD	3.36E-06	< LLD	3.36E-06
Cs-137	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Fe-59	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
La-140	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Mn-54	Ci	< LLD	< LLD	2.29E-06	1.09E-05	1.32E-05
Mo-99	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Nb-95	Ci	< LLD	< LLD	8.06E-07	1.02E-05	1.10E-05
Os-191	Ci	< LLD	2.15E-06	1.06E-05	1.74E-05	3.01E-05
Ru-103	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ru-106	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Sb-124	Ci	< LLD	< LLD	4.22E-06	8.03E-06	1.23E-05
Se-75	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Sr-89	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Sr-90	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Te-123m	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Zn-65	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Zr-95	Ci	< LLD	< LLD	< LLD	2.74E-06	2.74E-06
total	Ci	< LLD	2.15E-06	1.21E-04	3.73E-04	4.96E-04
4. Tritium						
H-3	Ci	4.99E+01	1.08E+02	6.27E+01	4.76E+01	2.68E+02



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Table 23: Unit 3 Gaseous Effluents - Ground Level Releases - Batch - Fission Gases and Iodines						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
1. Fission gases						
Ar-41	Ci	9.76E-02	1.02E-01	2.28E-01	8.28E-02	5.11E-01
Kr-85	Ci	4.11E-02	< LLD	9.47E-01	6.21E-01	1.61E+00
Kr-85m	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Kr-87	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Kr-88	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Xe-131m	Ci	< LLD	< LLD	4.58E-02	8.35E-02	1.29E-01
Xe-133	Ci	1.28E-02	1.25E-02	2.40E+01	9.00E-02	2.41E+01
Xe-133m	Ci	< LLD	< LLD	1.64E-02	< LLD	1.64E-02
Xe-135	Ci	< LLD	2.57E-04	2.06E-02	< LLD	2.09E-02
Xe-135m	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Xe-138	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
total	Ci	1.51E-01	1.15E-01	2.53E+01	8.77E-01	2.64E+01
2. Iodines						
I-131	Ci	< LLD	< LLD	1.15E-03	1.95E-03	3.10E-03
I-132	Ci	< LLD	< LLD	3.71E-03	4.59E-03	8.30E-03
I-133	Ci	< LLD	< LLD	1.08E-07	< LLD	1.08E-07
total	Ci	< LLD	< LLD	4.86E-03	6.54E-03	1.14E-02



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Table 24: Unit 3 Gaseous Effluents - Ground Level Releases - Batch - Particulates						
Nuclides Released	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Year total
3. Particulates						
Ba-140	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Br-82	Ci	1.04E-05	1.13E-05	8.35E-04	9.62E-06	8.66E-04
Ce-141	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ce-144	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Co-58	Ci	< LLD	< LLD	2.65E-07	4.06E-04	4.06E-04
Co-60	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Cr-51	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Cs-134	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Cs-137	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Fe-59	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
La-140	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Mn-54	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Mo-99	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Nb-95	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Os-191	Ci	< LLD	< LLD	1.08E-05	< LLD	1.08E-05
Ru-103	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Ru-106	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Sb-124	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Se-75	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Sr-89	Ci	Note 1	Note 1	Note 1	Note 1	Note 1
Sr-90	Ci	Note 1	Note 1	Note 1	Note 1	Note 1
Te-123m	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Zn-65	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
Zr-95	Ci	< LLD	< LLD	< LLD	< LLD	< LLD
total	Ci	1.04E-05	1.13E-05	8.46E-04	4.16E-04	1.28E-03
4. Tritium						
H-3	Ci	2.14E+02	1.85E+02	4.26E+02	6.61E+01	8.91E+02
Note 1 - Not required for batch releases						



1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 84



| Table 25:
Unit 3
Gaseous Effluents - Continuous and Batch - Fission Gases and Iodines | | | | | | |
|---|------|-----------|-----------|-----------|-----------|------------|
| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
| 1. Fission gases | | | | | | |
| Ar-41 | Ci | 9.76E-02 | 1.02E-01 | 2.28E-01 | 8.28E-02 | 5.11E-01 |
| Kr-85 | Ci | 4.11E-02 | < LLD | 9.47E-01 | 6.21E-01 | 1.61E+00 |
| Xe-131m | Ci | < LLD | < LLD | 4.58E-02 | 8.35E-02 | 1.29E-01 |
| Xe-133 | Ci | 1.28E-02 | 1.25E-02 | 2.91E+01 | 9.00E-02 | 2.92E+01 |
| Xe-133m | Ci | < LLD | < LLD | 1.64E-02 | < LLD | 1.64E-02 |
| Xe-135 | Ci | < LLD | 2.57E-04 | 2.06E-02 | < LLD | 2.09E-02 |
| total | Ci | 1.51E-01 | 1.15E-01 | 3.03E+01 | 8.77E-01 | 3.15E+01 |
| 2. Iodines | | | | | | |
| I-131 | Ci | < LLD | < LLD | 1.67E-03 | 2.23E-03 | 3.90E-03 |
| I-132 | Ci | < LLD | < LLD | 6.03E-03 | 4.78E-03 | 1.08E-02 |
| I-133 | Ci | < LLD | < LLD | 4.44E-05 | < LLD | 4.44E-05 |
| total | Ci | < LLD | < LLD | 7.74E-03 | 7.01E-03 | 1.47E-02 |

| Table 26:
Unit 3
Gaseous Effluents - Continuous and Batch - Particulates | | | | | | |
|--|------|-----------|-----------|-----------|-----------|------------|
| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
| 3. Particulates | | | | | | |
| Br-82 | Ci | 1.04E-05 | 1.13E-05 | 8.35E-04 | 9.62E-06 | 8.66E-04 |
| Co-58 | Ci | < LLD | < LLD | 5.39E-05 | 5.92E-04 | 6.46E-04 |
| Co-60 | Ci | < LLD | < LLD | 5.46E-06 | 2.71E-05 | 3.26E-05 |
| Cr-51 | Ci | < LLD | < LLD | 4.07E-05 | 1.10E-04 | 1.51E-04 |
| Cs-134 | Ci | < LLD | < LLD | 3.36E-06 | < LLD | 3.36E-06 |
| Mn-54 | Ci | < LLD | < LLD | 2.29E-06 | 1.09E-05 | 1.32E-05 |
| Nb-95 | Ci | < LLD | < LLD | 8.06E-07 | 1.02E-05 | 1.10E-05 |
| Os-191 | Ci | < LLD | 2.15E-06 | 2.14E-05 | 1.74E-05 | 4.09E-05 |
| Sb-124 | Ci | < LLD | < LLD | 4.22E-06 | 8.03E-06 | 1.23E-05 |
| Zr-95 | Ci | < LLD | < LLD | < LLD | 2.74E-06 | 2.74E-06 |
| total | Ci | 1.04E-05 | 1.35E-05 | 9.67E-04 | 7.89E-04 | 1.78E-03 |
| total >8days | Ci | < LLD | 2.15E-06 | 1.32E-04 | 7.79E-04 | 9.13E-04 |
| 4. Tritium | | | | | | |
| H-3 | Ci | 2.64E+02 | 2.93E+02 | 4.88E+02 | 1.14E+02 | 1.16E+03 |

| Table 27:
Unit 3
Radiation Doses At And Beyond The Site Boundary | | | | | | |
|---|------|-----------|-----------|-----------|-----------|------------|
| | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
| Gamma Air Dose | mrad | 2.58E-04 | 2.71E-04 | 3.52E-03 | 2.33E-04 | 4.28E-03 |
| ODCM Req 4.1 Limit | mrad | 5.00E+00 | 5.00E+00 | 5.00E+00 | 5.00E+00 | 1.00E+01 |
| % ODCM Limit | % | 5.16E-03 | 5.41E-03 | 7.04E-02 | 4.66E-03 | 4.28E-02 |
| Beta Air Dose | mrad | 1.17E-04 | 9.88E-05 | 9.40E-03 | 4.72E-04 | 1.01E-02 |
| ODCM Req 4.1 Limit | mrad | 1.00E+01 | 1.00E+01 | 1.00E+01 | 1.00E+01 | 2.00E+01 |
| % ODCM Limit | % | 1.17E-03 | 9.88E-04 | 9.40E-02 | 4.72E-03 | 5.04E-02 |
| Maximum Organ Dose
(excluding skin) | mrem | 9.48E-02 | 1.05E-01 | 1.96E-01 | 9.38E-02 | 4.64E-01 |
| Age | | Teen | Teen | Teen | Infant | Teen |
| Organ | | Thyroid | Thyroid | Thyroid | Thyroid | Thyroid |
| ODCM Req. 4.2 Limit | mrem | 7.50E+00 | 7.50E+00 | 7.50E+00 | 7.50E+00 | 1.50E+01 |
| % ODCM Limit | % | 1.26E+00 | 1.40E+00 | 2.61E+00 | 1.25E+00 | 3.09E+00 |

Calculations are based on parameters and methodologies of the ODCM using historical meteorology. Dose is calculated to a hypothetical individual. In contrast, Appendix C dose calculations are based on concurrent meteorology, a real individual, and only the actual pathways present.

Table 28:
Units 1, 2, and 3
Gaseous Effluents - Continuous - Fission Gases and Iodines -
Total By Quarter

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
|-------------------------|------|-----------|-----------|-----------|-----------|------------|
| 1. Fission gases | | | | | | |
| Ar-41 | Ci | <LLD | 8.75E-01 | <LLD | <LLD | 8.75E-01 |
| Xe-133 | Ci | 2.10E+01 | 2.28E+01 | 5.06E+00 | <LLD | 4.88E+01 |
| Xe-135 | Ci | 1.40E+01 | 2.84E+00 | <LLD | <LLD | 1.69E+01 |
| total | Ci | 3.50E+01 | 2.65E+01 | 5.06E+00 | <LLD | 6.66E+01 |
| 2. Iodines | | | | | | |
| I-131 | Ci | 3.30E-04 | 7.24E-05 | 5.23E-04 | 2.85E-04 | 1.21E-03 |
| I-132 | Ci | 8.85E-04 | <LLD | 2.32E-03 | 1.87E-04 | 3.39E-03 |
| I-133 | Ci | 4.23E-05 | 1.28E-05 | 4.43E-05 | <LLD | 9.95E-05 |
| total | Ci | 1.26E-03 | 8.52E-05 | 2.89E-03 | 4.72E-04 | 4.70E-03 |

Table 29:
Units 1, 2, and 3
Gaseous Effluents - Continuous - Particulates -
Total By Quarter

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
|------------------------|------|-----------|-----------|-----------|-----------|------------|
| 3. Particulates | | | | | | |
| Co-58 | Ci | 4.06E-05 | 3.02E-05 | 5.36E-05 | 1.86E-04 | 3.11E-04 |
| Co-60 | Ci | 7.86E-07 | 5.35E-06 | 1.34E-05 | 2.71E-05 | 4.67E-05 |
| Cr-51 | Ci | 4.31E-06 | < LLD | 4.07E-05 | 1.10E-04 | 1.55E-04 |
| Cs-134 | Ci | < LLD | < LLD | 3.36E-06 | < LLD | 3.36E-06 |
| Cs-137 | Ci | < LLD | 3.01E-06 | < LLD | < LLD | 3.01E-06 |
| Mn-54 | Ci | < LLD | < LLD | 2.29E-06 | 1.09E-05 | 1.32E-05 |
| Nb-95 | Ci | 1.76E-06 | < LLD | 8.06E-07 | 1.02E-05 | 1.28E-05 |
| Os-191 | Ci | 3.65E-05 | 2.17E-05 | 1.06E-05 | 1.78E-05 | 8.66E-05 |
| Ru-103 | Ci | 1.53E-06 | 7.47E-07 | < LLD | < LLD | 2.27E-06 |
| Sb-124 | Ci | < LLD | < LLD | 4.22E-06 | 8.03E-06 | 1.23E-05 |
| Se-75 | Ci | < LLD | 7.34E-07 | < LLD | < LLD | 7.34E-07 |
| Sr-89 | Ci | < LLD | < LLD | 4.70E-07 | < LLD | 4.70E-07 |
| Te-123m | Ci | 3.08E-07 | < LLD | < LLD | < LLD | 3.08E-07 |
| Zr-95 | Ci | < LLD | < LLD | < LLD | 2.74E-06 | 2.74E-06 |
| total | Ci | 8.58E-05 | 6.18E-05 | 1.29E-04 | 3.74E-04 | 6.51E-04 |
| 4. Tritium | | | | | | |
| H-3 | Ci | 9.60E+01 | 1.49E+02 | 1.09E+02 | 8.94E+01 | 4.43E+02 |

Table 30:
Units 1, 2, and 3
Gaseous Effluents - Batch - Fission Gases and Iodines -
Total By Quarter

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
|-------------------------|------|-----------|-----------|-----------|-----------|------------|
| 1. Fission gases | | | | | | |
| Ar-41 | Ci | 4.33E-01 | 3.64E-01 | 4.94E-01 | 4.99E-01 | 1.79E+00 |
| Kr-85 | Ci | 6.96E-01 | 5.57E-01 | 9.47E-01 | 6.21E-01 | 2.82E+00 |
| Xe-131m | Ci | 1.57E-01 | 5.86E+00 | 4.58E-02 | 8.35E-02 | 6.14E+00 |
| Xe-133 | Ci | 3.33E+01 | 3.54E+00 | 2.41E+01 | 2.94E-01 | 6.12E+01 |
| Xe-133m | Ci | 5.47E-01 | 2.08E-03 | 1.64E-02 | < LLD | 5.65E-01 |
| Xe-135 | Ci | 1.86E-01 | 3.73E-04 | 2.17E-02 | 4.43E-03 | 2.13E-01 |
| total | Ci | 3.53E+01 | 1.03E+01 | 2.56E+01 | 1.50E+00 | 7.27E+01 |
| 2. Iodines | | | | | | |
| I-131 | Ci | 1.20E-03 | 4.75E-08 | 1.15E-03 | 1.95E-03 | 4.30E-03 |
| I-132 | Ci | 5.00E-02 | < LLD | 3.71E-03 | 4.59E-03 | 5.83E-02 |
| I-133 | Ci | 6.37E-05 | 1.58E-07 | 1.08E-07 | < LLD | 6.40E-05 |
| total | Ci | 5.13E-02 | 2.06E-07 | 4.86E-03 | 6.54E-03 | 6.27E-02 |

Table 31:
Units 1, 2, and 3
Gaseous Effluents - Batch - Particulates -
Total By Quarter

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
|------------------------|------|-----------|-----------|-----------|-----------|------------|
| 3. Particulates | | | | | | |
| Br-82 | Ci | 5.12E-05 | 3.25E-05 | 8.55E-04 | 4.67E-05 | 9.85E-04 |
| Co-58 | Ci | 9.05E-04 | 1.83E-07 | 2.65E-07 | 4.06E-04 | 1.31E-03 |
| Co-60 | Ci | 1.83E-05 | < LLD | < LLD | < LLD | 1.83E-05 |
| Cr-51 | Ci | 1.91E-05 | < LLD | < LLD | < LLD | 1.91E-05 |
| Fe-59 | Ci | 5.99E-06 | < LLD | < LLD | < LLD | 5.99E-06 |
| Mn-54 | Ci | 1.05E-05 | < LLD | < LLD | < LLD | 1.05E-05 |
| Nb-95 | Ci | 2.25E-05 | < LLD | < LLD | < LLD | 2.25E-05 |
| Os-191 | Ci | < LLD | < LLD | 1.08E-05 | < LLD | 1.08E-05 |
| Ru-106 | Ci | 6.08E-03 | < LLD | < LLD | < LLD | 6.08E-03 |
| Zr-95 | Ci | 1.98E-05 | < LLD | < LLD | < LLD | 1.98E-05 |
| total | Ci | 7.13E-03 | 3.27E-05 | 8.66E-04 | 4.53E-04 | 8.48E-03 |
| 4. Tritium | | | | | | |
| H-3 | Ci | 4.65E+02 | 3.42E+02 | 5.10E+02 | 4.17E+02 | 1.73E+03 |



Table 32:
Units 1, 2, and 3
Gaseous Effluents - Continuous and Batch - Fission Gases and Iodines -
Total By Quarter

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
|-------------------------|------|-----------|-----------|-----------|-----------|------------|
| 1. Fission gases | | | | | | |
| Ar-41 | Ci | 4.33E-01 | 1.24E+00 | 4.94E-01 | 4.99E-01 | 2.66E+00 |
| Kr-85 | Ci | 6.96E-01 | 5.57E-01 | 9.47E-01 | 6.21E-01 | 2.82E+00 |
| Xe-131m | Ci | 1.57E-01 | 5.86E+00 | 4.58E-02 | 8.35E-02 | 6.14E+00 |
| Xe-133 | Ci | 5.43E+01 | 2.63E+01 | 2.91E+01 | 2.94E-01 | 1.10E+02 |
| Xe-133m | Ci | 5.47E-01 | 2.08E-03 | 1.64E-02 | < LLD | 5.65E-01 |
| Xe-135 | Ci | 1.42E+01 | 2.84E+00 | 2.17E-02 | 4.43E-03 | 1.71E+01 |
| total | Ci | 7.03E+01 | 3.68E+01 | 3.07E+01 | 1.50E+00 | 1.39E+02 |
| 2. Iodines | | | | | | |
| I-131 | Ci | 1.53E-03 | 7.24E-05 | 1.67E-03 | 2.23E-03 | 5.51E-03 |
| I-132 | Ci | 5.09E-02 | < LLD | 6.03E-03 | 4.78E-03 | 6.17E-02 |
| I-133 | Ci | 1.06E-04 | 1.30E-05 | 4.44E-05 | < LLD | 1.63E-04 |
| total | Ci | 5.26E-02 | 8.54E-05 | 7.74E-03 | 7.01E-03 | 6.74E-02 |

Table 33:
Units 1, 2, and 3
Gaseous Effluents - Continuous and Batch - Particulates -
Total By Quarter

| Nuclides Released | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
|------------------------|------|-----------|-----------|-----------|-----------|------------|
| 3. Particulates | | | | | | |
| Br-82 | Ci | 5.12E-05 | 3.25E-05 | 8.55E-04 | 4.67E-05 | 9.85E-04 |
| Co-58 | Ci | 9.46E-04 | 3.04E-05 | 5.39E-05 | 5.92E-04 | 1.62E-03 |
| Co-60 | Ci | 1.90E-05 | 5.35E-06 | 1.34E-05 | 2.71E-05 | 6.49E-05 |
| Cr-51 | Ci | 2.34E-05 | < LLD | 4.07E-05 | 1.10E-04 | 1.75E-04 |
| Cs-134 | Ci | < LLD | < LLD | 3.36E-06 | < LLD | 3.36E-06 |
| Cs-137 | Ci | < LLD | 3.01E-06 | < LLD | < LLD | 3.01E-06 |
| Fe-59 | Ci | 5.99E-06 | < LLD | < LLD | < LLD | 5.99E-06 |
| Mn-54 | Ci | 1.05E-05 | < LLD | 2.29E-06 | 1.09E-05 | 2.37E-05 |
| Nb-95 | Ci | 2.43E-05 | < LLD | 8.06E-07 | 1.02E-05 | 3.53E-05 |
| Os-191 | Ci | 3.65E-05 | 2.17E-05 | 2.14E-05 | 1.78E-05 | 9.74E-05 |
| Ru-103 | Ci | 1.53E-06 | 7.47E-07 | < LLD | < LLD | 2.27E-06 |
| Ru-106 | Ci | 6.08E-03 | < LLD | < LLD | < LLD | 6.08E-03 |
| Sb-124 | Ci | < LLD | < LLD | 4.22E-06 | 8.03E-06 | 1.23E-05 |
| Se-75 | Ci | < LLD | 7.34E-07 | < LLD | < LLD | 7.34E-07 |
| Sr-89 | Ci | < LLD | < LLD | 4.70E-07 | < LLD | 4.70E-07 |
| Te-123m | Ci | 3.08E-07 | < LLD | < LLD | < LLD | 3.08E-07 |
| Zr-95 | Ci | 1.98E-05 | < LLD | < LLD | 2.74E-06 | 2.26E-05 |
| total | Ci | 7.22E-03 | 9.45E-05 | 9.96E-04 | 8.26E-04 | 9.13E-03 |
| total > 8 days | Ci | 7.17E-03 | 6.20E-05 | 1.40E-04 | 7.80E-04 | 8.15E-03 |
| 4. Tritium | | | | | | |
| H-3 | Ci | 5.61E+02 | 4.91E+02 | 6.19E+02 | 5.06E+02 | 2.18E+03 |



Table 34:
Units 1, 2 and 3
Gaseous Effluents- Continuous - Fission Gases and Iodine -
Total By Unit

| Nuclides Released | Unit | Unit 1 | Unit 2 | Unit 3 | Total Units
1,2 and 3. |
|-------------------------|------|----------|----------|----------|---------------------------|
| 1. Fission gases | | | | | |
| Ar-41 | Ci | 8.75E-01 | < LLD | < LLD | 8.75E-01 |
| Xe-133 | Ci | 4.24E+01 | 1.39E+00 | 5.06E+00 | 4.88E+01 |
| Xe-135 | Ci | 1.44E+01 | 2.50E+00 | < LLD | 1.69E+01 |
| total | Ci | 5.76E+01 | 3.88E+00 | 5.06E+00 | 6.66E+01 |
| 2. Iodines | | | | | |
| I-131 | Ci | 4.07E-04 | < LLD | 8.03E-04 | 1.21E-03 |
| I-132 | Ci | 8.85E-04 | < LLD | 2.51E-03 | 3.39E-03 |
| I-133 | Ci | 5.52E-05 | < LLD | 4.43E-05 | 9.95E-05 |
| total | Ci | 1.35E-03 | < LLD | 3.35E-03 | 4.70E-03 |

Table 35:
Units 1, 2 and 3
Gaseous Effluents- Continuous - Particulates -
Total By Unit

| Nuclides Released | Unit | Unit 1 | Unit 2 | Unit 3 | Total Units
1,2 and 3 |
|------------------------|------|----------|----------|----------|--------------------------|
| 3. Particulates | | | | | |
| Co-58 | Ci | 7.09E-05 | < LLD | 2.40E-04 | 3.11E-04 |
| Co-60 | Ci | 1.41E-05 | < LLD | 3.26E-05 | 4.67E-05 |
| Cr-51 | Ci | 4.31E-06 | < LLD | 1.51E-04 | 1.55E-04 |
| Cs-134 | | < LLD | < LLD | 3.36E-06 | 3.36E-06 |
| Cs-137 | | 3.01E-06 | < LLD | < LLD | 3.01E-06 |
| Mn-54 | Ci | < LLD | < LLD | 1.32E-05 | 1.32E-05 |
| Nb-95 | Ci | 1.76E-06 | < LLD | 1.10E-05 | 1.28E-05 |
| Os-191 | Ci | 5.61E-05 | 4.13E-07 | 3.01E-05 | 8.66E-05 |
| Ru-103 | Ci | 2.27E-06 | < LLD | < LLD | 2.27E-06 |
| Sb-124 | Ci | < LLD | < LLD | 1.23E-05 | 1.23E-05 |
| Se-75 | Ci | 7.34E-07 | < LLD | < LLD | 7.34E-07 |
| Sr-89 | | 4.70E-07 | < LLD | < LLD | 4.70E-07 |
| Te-123m | Ci | 3.08E-07 | < LLD | < LLD | 3.08E-07 |
| Zr-95 | Ci | < LLD | < LLD | 2.74E-06 | 2.74E-06 |
| total | Ci | 1.54E-04 | 4.13E-07 | 4.96E-04 | 6.51E-04 |
| 4. Tritium | | | | | |
| H-3 | Ci | 1.05E+02 | 7.01E+01 | 2.68E+02 | 4.43E+02 |

**Table 36:
Units 1, 2 and 3
Gaseous Effluents- Batch - Fission Gases and Iodine -
Total By Unit**

| Nuclides Released | Unit | Unit 1 | Unit 2 | Unit 3 | Total Units
1,2 and 3 |
|-------------------------|------|----------|----------|----------|--------------------------|
| 1. Fission gases | | | | | |
| Ar-41 | Ci | 8.03E-01 | 4.75E-01 | 5.11E-01 | 1.79E+00 |
| Kr-85 | Ci | 1.21E+00 | < LLD | 1.61E+00 | 2.82E+00 |
| Xe-131m | Ci | 6.01E+00 | < LLD | 1.29E-01 | 6.14E+00 |
| Xe-133 | Ci | 3.71E+01 | 1.63E-02 | 2.41E+01 | 6.12E+01 |
| Xe-133m | Ci | 5.49E-01 | < LLD | 1.64E-02 | 5.65E-01 |
| Xe-135 | Ci | 1.92E-01 | < LLD | 2.09E-02 | 2.13E-01 |
| total | Ci | 4.58E+01 | 4.92E-01 | 2.64E+01 | 7.27E+01 |
| 2. Iodines | | | | | |
| I-131 | Ci | 1.20E-03 | < LLD | 3.10E-03 | 4.30E-03 |
| I-132 | Ci | 5.00E-02 | < LLD | 8.30E-03 | 5.83E-02 |
| I-133 | Ci | 6.39E-05 | < LLD | 1.08E-07 | 6.40E-05 |
| total | Ci | 5.13E-02 | < LLD | 1.14E-02 | 6.27E-02 |



| Table 37:
Units 1, 2 and 3
Gaseous Effluents- Batch - Particulates -
Total By Unit | | | | | |
|---|------|----------|----------|----------|--------------------------|
| Nuclides Released | Unit | Unit 1 | Unit 2 | Unit 3 | Total Units
1,2 and 3 |
| 3. Particulates | | | | | |
| Br-82 | Ci | 8.40E-05 | 3.53E-05 | 8.66E-04 | 9.85E-04 |
| Co-58 | Ci | 9.05E-04 | < LLD | 4.06E-04 | 1.31E-03 |
| Co-60 | Ci | 1.83E-05 | < LLD | < LLD | 1.83E-05 |
| Cr-51 | Ci | 1.91E-05 | < LLD | < LLD | 1.91E-05 |
| Fe-59 | Ci | 5.99E-06 | < LLD | < LLD | 5.99E-06 |
| Mn-54 | Ci | 1.05E-05 | < LLD | < LLD | 1.05E-05 |
| Nb-95 | | 2.25E-05 | < LLD | < LLD | 2.25E-05 |
| Os-191 | | < LLD | < LLD | 1.08E-05 | 1.08E-05 |
| Ru-106 | | 6.08E-03 | < LLD | < LLD | 6.08E-03 |
| Zr-95 | | 1.98E-05 | < LLD | < LLD | 1.98E-05 |
| total | Ci | 7.16E-03 | 3.53E-05 | 1.28E-03 | 8.48E-03 |
| 4. Tritium | | | | | |
| H-3 | Ci | 4.71E+02 | 3.71E+02 | 8.91E+02 | 1.73E+03 |



Table 38:
Units 1, 2 and 3
Gaseous Effluents- Continuous and Batch - Fission Gases and Iodine -
Total By Unit

| Nuclides Released | Unit | Unit 1 | Unit 2 | Unit 3 | Total Units
1,2 and 3 |
|-------------------------|------|----------|----------|----------|--------------------------|
| 1. Fission gases | | | | | |
| Ar-41 | Ci | 1.68E+00 | 4.75E-01 | 5.11E-01 | 2.66E+00 |
| Kr-85 | Ci | 1.21E+00 | < LLD | 1.61E+00 | 2.82E+00 |
| Xe-131m | Ci | 6.01E+00 | < LLD | 1.29E-01 | 6.14E+00 |
| Xe-133 | Ci | 7.94E+01 | 1.40E+00 | 2.92E+01 | 1.10E+02 |
| Xe-133m | Ci | 5.49E-01 | < LLD | 1.64E-02 | 5.65E-01 |
| Xe-135 | Ci | 1.46E+01 | 2.50E+00 | 2.09E-02 | 1.71E+01 |
| total | Ci | 1.03E+02 | 4.38E+00 | 3.15E+01 | 1.39E+02 |
| 2. Iodines | | | | | |
| I-131 | Ci | 1.61E-03 | < LLD | 3.90E-03 | 5.51E-03 |
| I-132 | Ci | 5.09E-02 | < LLD | 1.08E-02 | 6.17E-02 |
| I-133 | Ci | 1.19E-04 | < LLD | 4.44E-05 | 1.63E-04 |
| total | Ci | 5.27E-02 | < LLD | 1.47E-02 | 6.74E-02 |

Table 39:
Units 1, 2 and 3
Gaseous Effluents - Continuous and Batch - Particulates -
Total By Unit

| Nuclides Released | Unit | Unit 1 | Unit 2 | Unit 3 | Total Units
1,2 and 3 |
|------------------------|------|----------|----------|----------|--------------------------|
| 3. Particulates | | | | | |
| Br-82 | Ci | 8.40E-05 | 3.53E-05 | 8.66E-04 | 9.85E-04 |
| Co-58 | Ci | 9.76E-04 | < LLD | 6.46E-04 | 1.62E-03 |
| Co-60 | Ci | 3.23E-05 | < LLD | 3.26E-05 | 6.49E-05 |
| Cr-51 | Ci | 2.34E-05 | < LLD | 1.51E-04 | 1.75E-04 |
| Cs-134 | Ci | < LLD | < LLD | 3.36E-06 | 3.36E-06 |
| Cs-137 | Ci | 3.01E-06 | < LLD | < LLD | 3.01E-06 |
| Fe-59 | Ci | 5.99E-06 | < LLD | < LLD | 5.99E-06 |
| Mn-54 | Ci | 1.05E-05 | < LLD | 1.32E-05 | 2.37E-05 |
| Nb-95 | Ci | 2.43E-05 | < LLD | 1.10E-05 | 3.53E-05 |
| Os-191 | Ci | 5.61E-05 | 4.13E-07 | 4.09E-05 | 9.74E-05 |
| Ru-103 | Ci | 2.27E-06 | < LLD | < LLD | 2.27E-06 |
| Ru-106 | Ci | 6.08E-03 | < LLD | < LLD | 6.08E-03 |
| Sb-124 | Ci | < LLD | < LLD | 1.23E-05 | 1.23E-05 |
| Se-75 | Ci | 7.34E-07 | < LLD | < LLD | 7.34E-07 |
| Sr-89 | Ci | 4.70E-07 | < LLD | < LLD | 4.70E-07 |
| Te-123m | Ci | 3.08E-07 | < LLD | < LLD | 3.08E-07 |
| Zr-95 | Ci | 1.98E-05 | < LLD | 2.74E-06 | 2.26E-05 |
| total | | 7.32E-03 | 3.57E-05 | 1.78E-03 | 9.13E-03 |
| total > 8 days | Ci | 7.23E-03 | 4.13E-07 | 9.13E-04 | 8.15E-03 |
| 4. Tritium | | | | | |
| H-3 | Ci | 5.76E+02 | 4.42E+02 | 1.16E+03 | 2.18E+03 |



Table 40:
Estimation of Total Percent Error

The estimated total error is calculated as follows:

$$\text{Total Percent Error} = (E_1^2 + E_2^2 + E_3^2 + \dots + E_n^2)^{1/2}$$

Where E_n = Percent error associated with each contributing parameter.

Parameters contributing to errors in the measurement of gaseous effluents are; process flow rates, sample collection, analytical counting and tank volumes.

The following values (%) were used for error calculations.

| Fission & Act gases | I-131 | Particulates | Tritium | |
|---------------------|-------|--------------|---------|--|
| 25 | 25 | 25 | 25 | Sample counting error |
| 10 | 10 | 10 | 10 | Counting system calibration error |
| 5 | 5 | 5 | 5 | Counting system source error |
| 20 | N/A | N/A | N/A | Temperature/volume correction error |
| 10 | 10 | 10 | 10 | Process flow measuring device |
| N/A | 15 | 15 | 15 | Sample flow measuring device |
| N/A | 5 | N/A | N/A | Iodine collection efficiency error |
| N/A | N/A | 10 | N/A | Plateout error |
| N/A | N/A | N/A | 20 | Bubbler collection efficiency error |
| N/A | N/A | N/A | 2 | Sample volume transfer error (pipette) |
| N/A | N/A | N/A | 2 | Sample volume error (graduate) |

**Table 41:
Effluent Monitoring Instrumentation Out Of Service Greater Than 30 Days**

| Unit | Instrument | Date span of inoperability | Cause of inoperability | Explanation |
|------|------------|----------------------------|------------------------|-------------|
| NONE | | | | |

**Table 42:
Solid Waste Summary**

A. Solid Waste Shipped Offsite For Burial Or Disposal (not irradiated fuel)

| 1.0 Type of Waste | Unit | Jan-Dec | estimated
total error % |
|--|----------------|----------|----------------------------|
| 1.a. Spent resin, filters, sludges, evaporator bottoms, etc. | m ³ | 6.02E+01 | N/A |
| | Ci | 2.43E+02 | 2.50E+01 |
| 1.b. Dry compressible waste, contaminated equipment, etc. | m ³ | 3.35E+01 | N/A |
| | Ci | 8.57E+00 | 2.50E+01 |
| 1.c. Irradiated components, fuel rods, etc. | m ³ | 0.00E+00 | N/A |
| | Ci | 0.00E+00 | N/A |
| 1.d. Other (Chemical cleaning waste) | m ³ | 0.00E+00 | N/A |
| | Ci | 0.00E+00 | N/A |
| Volume and activity for dry compressible waste, contaminated equipment, etc., includes PVNGS waste disposed of after being processed by a volume reduction facility. | | | |

2.0 Principal Radionuclides

| 2.a Estimate of major nuclide concentration for spent resins, filter sludges, evaporator bottoms, etc. | | | |
|--|--------------|-------------------|----------|
| Waste Class | Nuclide Name | Percent Abundance | Curies |
| A | Fe-55 | 3.94E+01 | 5.05E+00 |
| A | Ni-63 | 1.68E+01 | 2.15E+00 |
| A | Co-58 | 1.22E+01 | 1.56E+00 |
| A | Co-60 | 1.14E+01 | 1.45E+00 |
| A | Cs-137 | 7.33E+00 | 9.38E-01 |
| A | Mn-54 | 3.55E+00 | 4.54E-01 |
| A | Cs-134 | 3.05E+00 | 3.91E-01 |
| A | C-14 | 2.34E+00 | 2.99E-01 |
| A | Sb-125 | 9.58E-01 | 1.23E-01 |
| A | Sb-124 | 5.90E-01 | 7.56E-02 |
| A | H-3 | 5.73E-01 | 7.34E-02 |
| A | Ag-110m | 4.58E-01 | 5.87E-02 |
| A | Zr-95 | 3.10E-01 | 3.96E-02 |
| A | Co-57 | 2.50E-01 | 3.20E-02 |
| A | Pu-241 | 1.67E-01 | 2.14E-02 |
| A | Nb-95 | 1.57E-01 | 2.01E-02 |
| A | Sn-113 | 1.18E-01 | 1.51E-02 |
| A | Cr-51 | 1.00E-01 | 1.29E-02 |
| A | Ni-59 | 9.19E-02 | 1.18E-02 |
| A | Ru-106 | 5.51E-02 | 7.06E-03 |
| A | Fe-59 | 4.66E-02 | 5.96E-03 |
| A | Zn-65 | 3.95E-02 | 5.06E-03 |
| A | Ce-144 | 2.99E-02 | 3.83E-03 |
| A | Sr-90 | 2.54E-02 | 3.25E-03 |
| A | Te-123m | 9.16E-03 | 1.17E-03 |
| A | Cm-243/244 | 5.72E-03 | 7.32E-04 |
| A | Pu-238 | 1.25E-03 | 1.60E-04 |
| A | Nb-94 | 2.63E-03 | 3.37E-04 |
| A | Am-241 | 2.10E-03 | 2.69E-04 |
| A | Sr-89 | 1.25E-03 | 1.60E-04 |
| A | Pu-239/240 | 1.21E-03 | 1.55E-04 |
| A | Ru-103 | 1.20E-03 | 1.54E-04 |
| A | Cm-242 | 6.55E-04 | 8.39E-05 |
| A | Ce-141 | 1.64E-04 | 2.10E-05 |
| A | Pu-242 | 3.81E-06 | 4.88E-07 |
| Total | | | 1.28E+01 |



1970
2040
100
2



1970
1000
100,000
100



| 2.b Estimate of major nuclide concentration for spent resins, filter sludges, evaporator bottoms, etc. | | | |
|--|--------------|-------------------|----------|
| Waste Class | Nuclide Name | Percent Abundance | Curies |
| B | Ni-63 | 3.25E+01 | 6.24E+01 |
| B | Cs-137 | 2.73E+01 | 5.24E+01 |
| B | Fe-55 | 1.27E+01 | 2.44E+01 |
| B | Cs-134 | 1.14E+01 | 2.18E+01 |
| B | Co-60 | 1.07E+01 | 2.05E+01 |
| B | Mn-54 | 1.25E+00 | 2.40E+00 |
| B | Co-58 | 9.98E-01 | 1.91E+00 |
| B | Sb-125 | 1.70E+00 | 3.26E+00 |
| B | C-14 | 6.76E-01 | 1.30E+00 |
| B | Ni-59 | 2.02E-01 | 3.88E-01 |
| B | Sr-90 | 1.69E-01 | 3.24E-01 |
| B | Ag-110m | 1.45E-01 | 2.78E-01 |
| B | Co-57 | 1.35E-01 | 2.59E-01 |
| B | Pu-241 | 4.59E-02 | 8.80E-02 |
| B | Sb-124 | 4.09E-02 | 7.85E-02 |
| B | H-3 | 3.16E-02 | 6.07E-02 |
| B | Sn-113 | 1.61E-02 | 3.08E-02 |
| B | Ce-144 | 1.21E-02 | 2.32E-02 |
| B | Sr-89 | 2.00E-03 | 3.83E-03 |
| B | Cm-243/244 | 1.74E-03 | 3.35E-03 |
| B | Pu-238 | 1.33E-03 | 2.55E-03 |
| B | Nb-95 | 8.82E-04 | 1.69E-03 |
| B | Am-241 | 5.25E-04 | 1.01E-03 |
| B | Pu-239/240 | 4.03E-04 | 7.73E-04 |
| B | Cm-242 | 1.96E-04 | 3.77E-04 |
| B | Ce-141 | 5.94E-06 | 1.14E-05 |
| | | Total | 1.92E+02 |



| 2.c Estimate of major nuclide concentration for spent resins, filter sludges, evaporator bottoms, etc. | | | |
|--|--------------|-------------------|----------|
| Waste Class | Nuclide Name | Percent Abundance | Curies |
| C | Fe-55 | 3.66E+01 | 1.38E+01 |
| C | Co-58 | 1.79E+01 | 6.78E+00 |
| C | Ni-63 | 1.59E+01 | 6.02E+00 |
| C | Co-60 | 1.30E+01 | 4.91E+00 |
| C | C-14 | 4.79E+00 | 1.81E+00 |
| C | Mn-54 | 2.47E+00 | 9.35E-01 |
| C | Sb-125 | 1.60E+00 | 6.06E-01 |
| C | H-3 | 1.34E+00 | 5.08E-01 |
| C | Zr-95 | 1.04E+00 | 3.94E-01 |
| C | Ag-110m | 1.01E+00 | 3.83E-01 |
| C | Ni-59 | 8.90E-01 | 3.37E-01 |
| C | Sb-124 | 8.05E-01 | 3.05E-01 |
| C | Ru-106 | 4.94E-01 | 1.87E-01 |
| C | Cr-51 | 3.62E-01 | 1.37E-01 |
| C | Nb-95 | 3.48E-01 | 1.32E-01 |
| C | Co-57 | 2.72E-01 | 1.03E-01 |
| C | Sn-113 | 2.07E-01 | 7.82E-02 |
| C | Pu-241 | 1.81E-01 | 6.85E-02 |
| C | Ce-144 | 1.23E-01 | 4.65E-02 |
| C | Cs-137 | 1.19E-01 | 4.49E-02 |
| C | Cs-134 | 1.12E-01 | 4.22E-02 |
| C | Ru-103 | 8.79E-02 | 3.32E-02 |
| C | Zn-65 | 6.95E-02 | 2.63E-02 |
| C | Te-123m | 6.74E-02 | 2.55E-02 |
| C | Fe-59 | 6.25E-02 | 2.36E-02 |
| C | Sr-90 | 5.03E-02 | 1.90E-02 |
| C | Ce-141 | 4.08E-02 | 1.54E-02 |
| C | Cm-242 | 5.10E-03 | 1.93E-03 |
| C | Cm-243/244 | 4.97E-03 | 1.88E-03 |
| C | Hf-181 | 4.36E-03 | 1.65E-03 |
| C | Sr-89 | 3.98E-03 | 1.51E-03 |
| C | Am-241 | 3.57E-03 | 1.35E-03 |
| C | Pu-238 | 2.74E-03 | 1.04E-03 |
| C | Pu-239/240 | 1.43E-03 | 5.41E-04 |
| C | Pu-242 | 1.22E-05 | 4.63E-06 |
| | | Total | 3.78E+01 |

| 2.d Estimate of major nuclide concentration for dry compressible waste, contaminated equipment, etc. | | | |
|--|--------------|-------------------|----------|
| Waste Class | Nuclide Name | Percent Abundance | Curies |
| A | Fe-55 | 3.93E+01 | 9.10E-01 |
| A | Co-60 | 1.86E+01 | 4.30E-01 |
| A | Co-58 | 1.32E+01 | 3.05E-01 |
| A | Ni-63 | 1.31E+01 | 3.04E-01 |
| A | C-14 | 3.16E+00 | 7.33E-02 |
| A | Cr-51 | 2.99E+00 | 6.93E-02 |
| A | Mn-54 | 2.14E+00 | 4.95E-02 |
| A | Nb-95 | 1.54E+00 | 3.56E-02 |
| A | Zr-95 | 1.44E+00 | 3.34E-02 |
| A | H-3 | 9.52E-01 | 2.20E-02 |
| A | Sb-125 | 7.32E-01 | 1.69E-02 |
| A | Pu-241 | 4.95E-01 | 1.15E-02 |
| A | Sb-124 | 4.20E-01 | 9.73E-03 |
| A | Fe-59 | 3.95E-01 | 9.16E-03 |
| A | Cs-137 | 3.47E-01 | 8.03E-03 |
| A | Ag-110m | 2.20E-01 | 5.09E-03 |
| A | Ce-144 | 1.82E-01 | 4.22E-03 |
| A | Sn-113 | 1.65E-01 | 3.81E-03 |
| A | Ce-141 | 1.19E-01 | 2.75E-03 |
| A | Ru-103 | 1.14E-01 | 2.65E-03 |
| A | Ni-59 | 1.04E-01 | 2.41E-03 |
| A | Cs-134 | 1.04E-01 | 2.41E-03 |
| A | Co-57 | 9.41E-02 | 2.18E-03 |
| A | Te-123m | 5.11E-02 | 1.18E-03 |
| A | Sr-90 | 4.14E-02 | 9.60E-04 |
| A | Sr-89 | 1.39E-02 | 3.21E-04 |
| A | Cm-243/244 | 1.36E-02 | 3.16E-04 |
| A | Pu-238 | 1.25E-02 | 2.90E-04 |
| A | Hf-181 | 9.01E-03 | 2.09E-04 |
| A | Am-241 | 6.23E-03 | 1.44E-04 |
| A | Pu-239/240 | 4.95E-03 | 1.15E-04 |
| A | Cm-242 | 4.74E-03 | 1.10E-04 |
| A | Zn-65 | 4.71E-04 | 1.09E-05 |
| A | Pu-242 | 7.88E-05 | 1.82E-06 |
| | | Total | 2.32E+00 |

| 2.e Estimate of major nuclide concentration for dry compressible waste, contaminated equipment, etc. | | | |
|--|--------------|-------------------|----------|
| Waste Class | Nuclide Name | Percent Abundance | Curies |
| C | Fe-55 | 4.70E+01 | 2.94E+00 |
| C | Co-60 | 2.34E+01 | 1.47E+00 |
| C | Ni-63 | 1.69E+01 | 1.06E+00 |
| C | C-14 | 4.99E+00 | 3.12E-01 |
| C | Co-58 | 2.69E+00 | 1.68E-01 |
| C | Pu-241 | 9.35E-01 | 5.84E-02 |
| C | Sb-125 | 8.59E-01 | 5.37E-02 |
| C | Mn-54 | 8.33E-01 | 5.21E-02 |
| C | H-3 | 3.80E-01 | 2.37E-02 |
| C | Zr-95 | 3.35E-01 | 2.10E-02 |
| C | Cs-137 | 2.75E-01 | 1.72E-02 |
| C | Nb-95 | 2.68E-01 | 1.68E-02 |
| C | Cr-51 | 2.13E-01 | 1.33E-02 |
| C | Ce-144 | 1.72E-01 | 1.07E-02 |
| C | Ag-110m | 1.59E-01 | 9.91E-03 |
| C | Ni-59 | 1.46E-01 | 9.14E-03 |
| C | Cs-134 | 9.49E-02 | 5.93E-03 |
| C | Fe-59 | 7.98E-02 | 4.99E-03 |
| C | Sr-90 | 7.61E-02 | 4.75E-03 |
| C | Sn-113 | 5.34E-02 | 3.34E-03 |
| C | Co-57 | 3.39E-02 | 2.12E-03 |
| C | Cm-243/244 | 2.21E-02 | 1.38E-03 |
| C | Sb-124 | 2.04E-02 | 1.28E-03 |
| C | Pu-238 | 1.93E-02 | 1.21E-03 |
| C | Te-123m | 1.38E-02 | 8.63E-04 |
| C | Pu-239/240 | 8.25E-03 | 5.15E-04 |
| C | Am-241 | 8.11E-03 | 5.07E-04 |
| C | Cm-242 | 2.59E-03 | 1.62E-04 |
| C | Pu-242 | 2.97E-04 | 1.86E-05 |
| C | Sr-89 | 5.12E-05 | 3.20E-06 |
| C | Ru-103 | 1.86E-06 | 1.16E-07 |
| C | Ce-141 | 9.90E-07 | 6.19E-08 |
| C | Hf-181 | 2.80E-11 | 1.75E-12 |
| Total | | | 6.25E+00 |

3.0 Solid Waste Disposition

3.a

| Shipments | Shipper | Mode Of Transportation | Destination |
|-----------|---------|------------------------|--------------|
| 21 | APS | TRUCK | Barnwell, SC |
| 36 | GTS | TRUCK | Barnwell, SC |

3.b Irradiated Fuel Shipments: None

3.c Supplemental Information (This section includes PVNGS and Vendor supplied containers):

| Number of Containers | Container Volume ft ³ | Type of Waste | Container Type | Solidification Agent |
|----------------------|----------------------------------|--------------------------|----------------|----------------------|
| 7 | 132.4 | Resin | EL-142 | None |
| 1 | 202.1 | Resin | EL-210 | None |
| 1 | 49.9 | Filters | EA-50 | None |
| 2 | 51.2 | Filters | EL-50 | None |
| 109 | 7.5 | Concentrate | Drum | None |
| 37 | 7.5 | Dry Active Waste | Drum | None |
| 20 | 46 | Dry Active Waste | OP-45 | None |
| 48 | 11.6 | Dry Active Waste | Drum | None |
| 3 | 51.2 | Filters/Dry Active Waste | EL-50 | None |
| 1 | 199.4 | Dry Active Waste | ES-210 | None |

4.0 Changes to Processes and/or Equipment

- 4.a The Process Control Program has been revised. The changes are discussed in Appendix F.
- 4.b No major changes were made to installed plant equipment.
- 4.c No major changes were made to installed plant equipment. Therefore, predicted release or quantity of solid waste generated, remain unchanged as addressed in the UFSAR.
- 4.d No major changes were made to installed plant equipment. Therefore, predicted exposure to the public and general population, remain unchanged as addressed in the UFSAR.



APPENDIX B
METEOROLOGY



JOINT FREQUENCY DISTRIBUTION TABLES

The tables presented in this section are results obtained from processing the hourly meteorological data collected at the Palo Verde Nuclear Generating Station for the period of January - December 1998. The joint frequency distribution (JFD) tables represent the frequency, in terms of the number of observations, that a particular wind speed, wind direction, and stability category occurred simultaneously. On a quarterly, semiannual and annual basis, the JFDs were produced for 35-foot wind speed and wind direction by atmospheric stability class corresponding to the seven Pasquill stability categories, and for wind speed and wind direction for all stability classes combined. Atmospheric stability was classified per Regulatory Guide 1.23, using the 200-foot to 35-foot temperature difference (ΔT).

In accordance with NUREG-0133, the batch releases for 1998 were considered as "long term," since for each quarter, the sum of the batch release periods for each unit exceeded 150 hours. Consequently, the JFDs for the batch releases for all quarters are the same as for the continuous releases.

Discussion

A summary of 1998 Joint Frequency Distribution (JFD) shows a somewhat typical year, but variable year. Of the 8760 hours available, only 25 were lost for a 99.7% recovery. The majority of the lost hours (22) were a result of an Uninterruptable Power Supply (UPS) failure in August.

The average wind speed was 6.7 mph. Distribution of directions was spread over the compass with a predominant direction (3 sectors of 22.5 degrees each) centered on southwest. (31.4%) A secondary maximum of three sectors centered on the north contained 26.7% of the total. Speeds averaged higher with southwesterly flow; the most frequent speed was 10.0 mph. With the northerly directions, the highest frequency occurred at 4.0 mph. Stability class G (extremely stable) existed 23.5% of the time and overall stable conditions (E,F,G) dominated with 57.0% of all hours. Unstable categories (A,B,C) accounted for 25.0%; the neutral (D) had the balance.

Light northerly flow is most likely for stable conditions, while unstable atmospheres are usually associated with faster southwesterly winds. This distribution is typical of moderate altitude dry climates.

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 3/31/1998

*** 1ST QTR ***

STABILITY CLASS A
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4.51- 5.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.51- 6.50 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 6.51- 8.50 | 0 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 |
| 8.51-11.50 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 4 | 1 | 2 | 2 | 3 | 0 | 0 | 14 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 1 | 1 | 6 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 4 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 5 |
| TOTAL | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 0 | 2 | 3 | 12 | 1 | 2 | 3 | 4 | 1 | 35 |

STABILITY CLASS B

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4.51- 5.50 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |
| 5.51- 6.50 | 0 | 0 | 1 | 2 | 0 | 0 | 1 | 0 | 0 | 3 | 1 | 0 | 3 | 1 | 0 | 0 | 12 |
| 6.51- 8.50 | 1 | 1 | 5 | 2 | 1 | 0 | 2 | 4 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 19 |
| 8.51-11.50 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 2 | 0 | 1 | 4 | 6 | 3 | 1 | 2 | 0 | 25 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 5 | 1 | 2 | 1 | 1 | 2 | 14 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 2 | 0 | 0 | 6 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| TOTAL | 1 | 1 | 6 | 9 | 4 | 0 | 3 | 6 | 4 | 5 | 15 | 9 | 8 | 5 | 3 | 2 | 81 |

STABILITY CLASS C

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 5 |
| 3.51- 4.50 | 0 | 1 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 12 |
| 4.51- 5.50 | 2 | 4 | 6 | 4 | 0 | 1 | 0 | 1 | 0 | 5 | 5 | 5 | 9 | 4 | 2 | 1 | 49 |
| 5.51- 6.50 | 0 | 1 | 0 | 4 | 0 | 0 | 0 | 2 | 0 | 3 | 4 | 4 | 0 | 1 | 1 | 0 | 20 |
| 6.51- 8.50 | 0 | 0 | 5 | 6 | 4 | 1 | 0 | 2 | 5 | 3 | 4 | 4 | 2 | 1 | 0 | 0 | 37 |
| 8.51-11.50 | 0 | 0 | 2 | 6 | 2 | 2 | 1 | 1 | 1 | 0 | 4 | 3 | 1 | 2 | 1 | 0 | 26 |
| 11.51-14.50 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 10 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 3 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 2 | 6 | 18 | 24 | 8 | 4 | 1 | 6 | 6 | 12 | 20 | 26 | 14 | 11 | 4 | 1 | 163 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 3/31/1998

*** 1ST QTR ***

STABILITY CLASS D
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 2 | 2 | 5 | 4 | 3 | 5 | 5 | 1 | 33 |
| 2.51- 3.50 | 9 | 10 | 4 | 2 | 2 | 1 | 3 | 3 | 3 | 10 | 10 | 6 | 8 | 5 | 8 | 5 | 89 |
| 3.51- 4.50 | 4 | 7 | 9 | 6 | 2 | 1 | 2 | 3 | 8 | 7 | 13 | 13 | 9 | 6 | 12 | 4 | 106 |
| 4.51- 5.50 | 3 | 5 | 3 | 6 | 0 | 2 | 2 | 1 | 4 | 10 | 9 | 8 | 2 | 2 | 1 | 0 | 58 |
| 5.51- 6.50 | 0 | 0 | 4 | 8 | 3 | 2 | 0 | 1 | 4 | 5 | 3 | 4 | 2 | 0 | 0 | 0 | 36 |
| 6.51- 8.50 | 0 | 2 | 2 | 5 | 2 | 5 | 2 | 4 | 8 | 5 | 5 | 7 | 4 | 2 | 0 | 2 | 55 |
| 8.51-11.50 | 1 | 0 | 3 | 4 | 14 | 3 | 3 | 4 | 8 | 7 | 7 | 3 | 2 | 4 | 1 | 0 | 64 |
| 11.51-14.50 | 1 | 0 | 0 | 2 | 5 | 3 | 0 | 1 | 1 | 2 | 3 | 1 | 4 | 7 | 2 | 0 | 32 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 1 | 4 | 4 | 2 | 3 | 2 | 0 | 1 | 24 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 1 | 0 | 0 | 6 |
| TOTAL | 18 | 25 | 26 | 35 | 34 | 18 | 13 | 18 | 39 | 54 | 61 | 48 | 38 | 34 | 29 | 13 | 503 |

STABILITY CLASS E

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| 1.51- 2.50 | 4 | 3 | 2 | 1 | 1 | 0 | 0 | 0 | 3 | 0 | 1 | 4 | 7 | 3 | 8 | 3 | 40 |
| 2.51- 3.50 | 7 | 4 | 2 | 2 | 2 | 0 | 0 | 2 | 1 | 0 | 4 | 6 | 11 | 21 | 9 | 7 | 78 |
| 3.51- 4.50 | 6 | 8 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 4 | 4 | 7 | 6 | 7 | 5 | 52 |
| 4.51- 5.50 | 7 | 7 | 0 | 1 | 0 | 3 | 0 | 2 | 2 | 5 | 4 | 2 | 7 | 0 | 2 | 3 | 45 |
| 5.51- 6.50 | 3 | 2 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 4 | 9 | 1 | 4 | 0 | 0 | 1 | 28 |
| 6.51- 8.50 | 1 | 3 | 0 | 2 | 2 | 1 | 0 | 5 | 2 | 13 | 5 | 4 | 9 | 4 | 3 | 4 | 58 |
| 8.51-11.50 | 1 | 0 | 2 | 6 | 1 | 2 | 1 | 2 | 0 | 5 | 13 | 7 | 9 | 11 | 5 | 0 | 65 |
| 11.51-14.50 | 0 | 0 | 1 | 4 | 6 | 5 | 2 | 2 | 0 | 1 | 8 | 1 | 2 | 2 | 0 | 0 | 34 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 13 | 0 | 2 | 0 | 2 | 2 | 3 | 2 | 3 | 4 | 1 | 1 | 33 |
| >20.50 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 12 |
| TOTAL | 29 | 27 | 10 | 18 | 30 | 11 | 6 | 15 | 11 | 32 | 52 | 31 | 60 | 56 | 35 | 24 | 447 |

STABILITY CLASS F

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1.51- 2.50 | 2 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 7 | 11 | 4 | 40 |
| 2.51- 3.50 | 14 | 7 | 3 | 2 | 1 | 3 | 1 | 0 | 0 | 2 | 5 | 4 | 4 | 15 | 20 | 21 | 102 |
| 3.51- 4.50 | 13 | 4 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 5 | 2 | 10 | 20 | 21 | 81 |
| 4.51- 5.50 | 8 | 5 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 2 | 4 | 7 | 5 | 11 | 49 |
| 5.51- 6.50 | 6 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 6 | 2 | 4 | 3 | 29 |
| 6.51- 8.50 | 4 | 1 | 3 | 2 | 1 | 0 | 1 | 0 | 4 | 8 | 7 | 6 | 5 | 6 | 5 | 6 | 59 |
| 8.51-11.50 | 0 | 1 | 1 | 3 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 1 | 0 | 6 | 3 | 0 | 21 |
| 11.51-14.50 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 7 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 47 | 23 | 14 | 14 | 3 | 6 | 2 | 3 | 6 | 14 | 19 | 25 | 27 | 53 | 68 | 66 | 390 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 3/31/1998

*** 1ST QTR ***

STABILITY CLASS G
STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET

WIND MEASURED AT: 35.0 FEET

WIND THRESHOLD AT: .75 MPH

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 1.51- 2.50 | 11 | 7 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 8 | 14 | 16 | 61 |
| 2.51- 3.50 | 30 | 13 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 4 | 6 | 6 | 9 | 27 | 39 | 142 |
| 3.51- 4.50 | 49 | 22 | 3 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 4 | 3 | 7 | 22 | 38 | 152 |
| 4.51- 5.50 | 38 | 20 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 8 | 26 | 98 |
| 5.51- 6.50 | 16 | 16 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 9 | 48 |
| 6.51- 8.50 | 13 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 33 |
| 8.51-11.50 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 160 | 95 | 12 | 5 | 1 | 2 | 1 | 1 | 1 | 2 | 5 | 12 | 11 | 27 | 74 | 132 | 541 |

STABILITY CLASS ALL

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 5 |
| 1.51- 2.50 | 17 | 14 | 6 | 4 | 1 | 1 | 1 | 2 | 5 | 2 | 7 | 12 | 17 | 23 | 38 | 24 | 174 |
| 2.51- 3.50 | 60 | 34 | 14 | 7 | 5 | 4 | 4 | 5 | 5 | 14 | 23 | 23 | 31 | 51 | 64 | 72 | 416 |
| 3.51- 4.50 | 72 | 42 | 18 | 11 | 2 | 4 | 2 | 5 | 8 | 9 | 19 | 32 | 21 | 29 | 61 | 68 | 403 |
| 4.51- 5.50 | 58 | 41 | 13 | 13 | 1 | 6 | 3 | 5 | 6 | 20 | 21 | 18 | 23 | 15 | 18 | 41 | 302 |
| 5.51- 6.50 | 25 | 21 | 7 | 15 | 4 | 3 | 2 | 3 | 5 | 17 | 19 | 12 | 15 | 5 | 8 | 13 | 174 |
| 6.51- 8.50 | 19 | 22 | 16 | 19 | 12 | 7 | 5 | 15 | 20 | 29 | 22 | 22 | 20 | 14 | 8 | 16 | 266 |
| 8.51-11.50 | 3 | 3 | 8 | 26 | 19 | 8 | 5 | 10 | 11 | 15 | 33 | 21 | 17 | 26 | 15 | 0 | 220 |
| 11.51-14.50 | 1 | 0 | 2 | 11 | 15 | 9 | 2 | 3 | 3 | 4 | 20 | 7 | 8 | 11 | 4 | 3 | 103 |
| 14.51-20.50 | 0 | 0 | 0 | 2 | 19 | 0 | 2 | 0 | 5 | 7 | 13 | 5 | 6 | 9 | 1 | 2 | 71 |
| >20.50 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 1 | 5 | 6 | 0 | 2 | 6 | 0 | 0 | 26 |
| TOTAL | 257 | 177 | 86 | 108 | 83 | 42 | 26 | 49 | 69 | 122 | 184 | 152 | 160 | 189 | 217 | 239 | 2160 |

TOTAL NUMBER OF OBSERVATIONS: 2160

TOTAL NUMBER OF VALID OBSERVATIONS: 2160

TOTAL NUMBER OF MISSING OBSERVATIONS: 0

PERCENT DATA RECOVERY FOR THIS PERIOD: 100.0 %

MEAN WIND SPEED FOR THIS PERIOD: 6.1 MPH

TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

| A | B | C | D | E | F | G |
|------|------|------|-------|-------|-------|-------|
| 1.62 | 3.75 | 7.55 | 23.29 | 20.69 | 18.06 | 25.05 |

DISTRIBUTION OF WIND DIRECTION VS STABILITY

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | CALM |
|-------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|------|
| A | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 0 | 2 | 3 | 12 | 1 | 2 | 3 | 4 | 1 | 0 |
| B | 1 | 1 | 6 | 9 | 4 | 0 | 3 | 6 | 4 | 5 | 15 | 9 | 8 | 5 | 3 | 2 | 0 |
| C | 2 | 6 | 18 | 24 | 8 | 4 | 1 | 6 | 6 | 12 | 20 | 26 | 14 | 11 | 4 | 1 | 0 |
| D | 18 | 25 | 26 | 35 | 34 | 18 | 13 | 18 | 39 | 54 | 61 | 48 | 38 | 34 | 29 | 13 | 0 |
| E | 29 | 27 | 10 | 18 | 30 | 11 | 6 | 15 | 11 | 32 | 52 | 31 | 60 | 56 | 35 | 24 | 0 |
| F | 47 | 23 | 14 | 14 | 3 | 6 | 2 | 3 | 6 | 14 | 19 | 25 | 27 | 53 | 68 | 66 | 0 |
| G | 160 | 95 | 12 | 5 | 1 | 2 | 1 | 1 | 1 | 2 | 5 | 12 | 11 | 27 | 74 | 132 | 0 |
| TOTAL | 257 | 177 | 86 | 108 | 83 | 42 | 26 | 49 | 69 | 122 | 184 | 152 | 160 | 189 | 217 | 239 | 0 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 4/01/1998 TO 6/30/1998

*** 2ND QTR ***

STABILITY CLASS A
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4.51- 5.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.51- 6.50 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 7 | 5 | 8 | 0 | 1 | 0 | 0 | 0 | 25 |
| 6.51- 8.50 | 0 | 0 | 0 | 2 | 1 | 4 | 1 | 10 | 26 | 24 | 23 | 17 | 4 | 0 | 0 | 0 | 112 |
| 8.51-11.50 | 0 | 0 | 0 | 2 | 2 | 3 | 3 | 4 | 17 | 36 | 74 | 24 | 4 | 0 | 2 | 2 | 173 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 5 | 15 | 53 | 5 | 2 | 4 | 1 | 1 | 88 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 7 | 32 | 9 | 1 | 0 | 1 | 0 | 54 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 0 | 1 | 0 | 0 | 0 | 8 |
| TOTAL | 0 | 0 | 0 | 5 | 6 | 7 | 5 | 15 | 60 | 91 | 192 | 55 | 13 | 4 | 4 | 3 | 460 |

STABILITY CLASS B

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 4.51- 5.50 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 11 | 2 | 3 | 1 | 0 | 0 | 0 | 0 | 20 |
| 5.51- 6.50 | 0 | 0 | 2 | 0 | 3 | 0 | 2 | 5 | 18 | 13 | 5 | 1 | 0 | 0 | 0 | 0 | 49 |
| 6.51- 8.50 | 0 | 0 | 2 | 1 | 1 | 2 | 6 | 7 | 12 | 10 | 10 | 7 | 0 | 1 | 0 | 1 | 60 |
| 8.51-11.50 | 0 | 0 | 0 | 6 | 0 | 1 | 0 | 0 | 1 | 6 | 16 | 4 | 2 | 0 | 1 | 0 | 37 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 7 | 2 | 0 | 0 | 0 | 0 | 11 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 8 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 1 | 0 | 4 | 8 | 9 | 3 | 9 | 12 | 44 | 32 | 44 | 17 | 2 | 1 | 1 | 1 | 188 |

STABILITY CLASS C

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 3.51- 4.50 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 8 |
| 4.51- 5.50 | 1 | 0 | 3 | 0 | 3 | 1 | 0 | 1 | 9 | 3 | 7 | 2 | 0 | 1 | 0 | 0 | 31 |
| 5.51- 6.50 | 0 | 0 | 0 | 2 | 0 | 1 | 1 | 4 | 9 | 9 | 5 | 2 | 1 | 0 | 0 | 0 | 34 |
| 6.51- 8.50 | 0 | 0 | 1 | 1 | 4 | 0 | 0 | 2 | 3 | 1 | 10 | 1 | 2 | 1 | 2 | 1 | 29 |
| 8.51-11.50 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 9 | 2 | 2 | 1 | 2 | 0 | 18 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 7 | 1 | 0 | 2 | 0 | 0 | 13 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 0 | 0 | 5 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 1 | 2 | 4 | 4 | 8 | 4 | 3 | 8 | 22 | 19 | 43 | 9 | 5 | 5 | 4 | 1 | 142 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 4/01/1998 TO 6/30/1998

*** 2ND QTR ***

STABILITY CLASS D
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| .76- 1.50 | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 3 | 2 | 2 | 3 | 17 |
| 1.51- 2.50 | 0 | 1 | 4 | 2 | 3 | 3 | 2 | 4 | 4 | 3 | 1 | 1 | 3 | 4 | 4 | 1 | 40 |
| 2.51- 3.50 | 5 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 12 | 3 | 4 | 1 | 1 | 1 | 0 | 0 | 35 |
| 3.51- 4.50 | 0 | 1 | 0 | 2 | 1 | 0 | 3 | 0 | 9 | 9 | 5 | 1 | 3 | 1 | 0 | 0 | 35 |
| 4.51- 5.50 | 1 | 1 | 1 | 3 | 1 | 0 | 0 | 0 | 6 | 3 | 5 | 3 | 1 | 0 | 1 | 0 | 26 |
| 5.51- 6.50 | 1 | 1 | 0 | 2 | 1 | 1 | 0 | 0 | 3 | 4 | 8 | 6 | 3 | 1 | 0 | 0 | 31 |
| 6.51- 8.50 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 3 | 4 | 8 | 9 | 4 | 2 | 1 | 0 | 36 |
| 8.51-11.50 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 3 | 13 | 9 | 1 | 1 | 0 | 0 | 31 |
| 11.51-14.50 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 2 | 5 | 8 | 3 | 1 | 0 | 0 | 2 | 25 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 3 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 8 | 7 | 9 | 12 | 13 | 5 | 9 | 6 | 41 | 35 | 54 | 34 | 20 | 12 | 8 | 6 | 279 |

STABILITY CLASS E

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| .76- 1.50 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 1.51- 2.50 | 3 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 3 | 0 | 2 | 0 | 15 |
| 2.51- 3.50 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 6 | 5 | 1 | 3 | 1 | 2 | 27 |
| 3.51- 4.50 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 4 | 4 | 2 | 2 | 1 | 2 | 22 |
| 4.51- 5.50 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 5 | 6 | 1 | 6 | 1 | 1 | 1 | 1 | 26 |
| 5.51- 6.50 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 2 | 3 | 13 | 7 | 2 | 2 | 0 | 1 | 35 |
| 6.51- 8.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 1 | 14 | 17 | 21 | 12 | 1 | 0 | 0 | 70 |
| 8.51-11.50 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 1 | 6 | 10 | 28 | 29 | 6 | 2 | 1 | 0 | 88 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 2 | 11 | 8 | 13 | 7 | 1 | 0 | 0 | 45 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 8 | 9 | 5 | 1 | 2 | 0 | 6 | 7 | 21 | 49 | 81 | 85 | 34 | 12 | 6 | 6 | 332 |

STABILITY CLASS F

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|---|-----|----|-----|---|-----|-----|-----|----|-----|----|-----|-------|
| CALM | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| .76- 1.50 | 1 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 2 | 1 | 4 | 19 |
| 1.51- 2.50 | 4 | 2 | 1 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 3 | 6 | 12 | 3 | 8 | 6 | 52 |
| 2.51- 3.50 | 4 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 4 | 4 | 5 | 6 | 6 | 9 | 5 | 46 |
| 3.51- 4.50 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 4 | 7 | 4 | 3 | 1 | 4 | 4 | 34 |
| 4.51- 5.50 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 14 | 7 | 10 | 5 | 1 | 4 | 50 |
| 5.51- 6.50 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 40 | 26 | 12 | 6 | 7 | 1 | 108 |
| 6.51- 8.50 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 4 | 34 | 9 | 3 | 0 | 0 | 0 | 53 |
| 8.51-11.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 4 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 14 | 7 | 5 | 3 | 3 | 2 | 2 | 2 | 4 | 32 | 106 | 59 | 51 | 23 | 31 | 24 | 368 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 4/01/1998 TO 6/30/1998

*** 2ND QTR ***

STABILITY CLASS G
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 3 | 3 | 2 | 19 |
| 2.51- 3.50 | 25 | 12 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 2 | 3 | 5 | 15 | 22 | 89 |
| 3.51- 4.50 | 40 | 16 | 4 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 5 | 3 | 8 | 6 | 9 | 34 | 128 |
| 4.51- 5.50 | 25 | 15 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 3 | 4 | 3 | 3 | 11 | 75 |
| 5.51- 6.50 | 19 | 17 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 6 | 0 | 2 | 2 | 1 | 7 | 58 |
| 6.51- 8.50 | 5 | 12 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 1 | 0 | 1 | 1 | 2 | 37 |
| 8.51-11.50 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 1 | 0 | 0 | 0 | 0 | 9 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 119 | 73 | 17 | 5 | 0 | 1 | 0 | 3 | 1 | 11 | 25 | 11 | 19 | 20 | 32 | 78 | 415 |

STABILITY CLASS ALL

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| 1.51- 2.50 | 9 | 4 | 4 | 2 | 1 | 0 | 2 | 0 | 1 | 2 | 6 | 2 | 13 | 7 | 8 | 9 | 70 |
| 2.51- 3.50 | 33 | 17 | 7 | 4 | 4 | 5 | 2 | 8 | 7 | 6 | 11 | 14 | 19 | 15 | 28 | 31 | 211 |
| 3.51- 4.50 | 49 | 22 | 6 | 4 | 1 | 2 | 4 | 3 | 16 | 10 | 19 | 13 | 17 | 15 | 19 | 41 | 241 |
| 4.51- 5.50 | 31 | 18 | 8 | 4 | 6 | 1 | 4 | 2 | 35 | 27 | 26 | 17 | 11 | 7 | 8 | 16 | 221 |
| 5.51- 6.50 | 21 | 20 | 7 | 7 | 6 | 1 | 4 | 11 | 44 | 39 | 56 | 20 | 17 | 9 | 3 | 12 | 277 |
| 6.51- 8.50 | 7 | 13 | 10 | 7 | 7 | 7 | 7 | 22 | 45 | 71 | 113 | 79 | 33 | 11 | 10 | 5 | 447 |
| 8.51-11.50 | 0 | 2 | 2 | 10 | 3 | 5 | 9 | 6 | 28 | 63 | 173 | 78 | 21 | 5 | 7 | 2 | 414 |
| 11.51-14.50 | 0 | 1 | 0 | 0 | 8 | 1 | 2 | 0 | 8 | 30 | 91 | 31 | 10 | 8 | 1 | 1 | 192 |
| 14.51-20.50 | 1 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 7 | 15 | 47 | 15 | 2 | 0 | 1 | 2 | 95 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 6 | 3 | 1 | 1 | 0 | 0 | 0 | 13 |
| TOTAL | 151 | 98 | 44 | 38 | 41 | 22 | 34 | 53 | 193 | 269 | 545 | 270 | 144 | 77 | 86 | 119 | 2184 |

TOTAL NUMBER OF OBSERVATIONS: 2184

TOTAL NUMBER OF VALID OBSERVATIONS: 2184

TOTAL NUMBER OF MISSING OBSERVATIONS: 0

PERCENT DATA RECOVERY FOR THIS PERIOD: 100.0 %

MEAN WIND SPEED FOR THIS PERIOD: 7.5 MPH

TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

| | | | | | | |
|-------|------|------|-------|-------|-------|-------|
| A | B | C | D | E | F | G |
| 21.06 | 8.61 | 6.50 | 12.77 | 15.20 | 16.85 | 19.00 |

DISTRIBUTION OF WIND DIRECTION VS STABILITY

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | CALM |
|-------|-----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|----|-----|------|
| A | 0 | 0 | 0 | 5 | 6 | 7 | 5 | 15 | 60 | 91 | 192 | 55 | 13 | 4 | 4 | 3 | 0 |
| B | 1 | 0 | 4 | 8 | 9 | 3 | 9 | 12 | 44 | 32 | 44 | 17 | 2 | 1 | 1 | 1 | 0 |
| C | 1 | 2 | 4 | 4 | 8 | 4 | 3 | 8 | 22 | 19 | 43 | 9 | 5 | 5 | 4 | 1 | 0 |
| D | 8 | 7 | 9 | 12 | 13 | 5 | 9 | 6 | 41 | 35 | 54 | 34 | 20 | 12 | 8 | 6 | 0 |
| E | 8 | 9 | 5 | 1 | 2 | 0 | 6 | 7 | 21 | 49 | 81 | 85 | 34 | 12 | 6 | 6 | 0 |
| F | 14 | 7 | 5 | 3 | 3 | 2 | 2 | 2 | 4 | 32 | 106 | 59 | 51 | 23 | 31 | 24 | 0 |
| G | 119 | 73 | 17 | 5 | 0 | 1 | 0 | 3 | 1 | 11 | 25 | 11 | 19 | 20 | 32 | 78 | 0 |
| TOTAL | 151 | 98 | 44 | 38 | 41 | 22 | 34 | 53 | 193 | 269 | 545 | 270 | 144 | 77 | 86 | 119 | 0 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 6/30/1998

*** 1ST SEMI ***

STABILITY CLASS A
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4.51- 5.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.51- 6.50 | 0 | 0 | 0 | 1 | 2 | 0 | 1 | 1 | 7 | 5 | 8 | 0 | 1 | 0 | 0 | 0 | 26 |
| 6.51- 8.50 | 0 | 0 | 0 | 4 | 3 | 4 | 1 | 10 | 26 | 24 | 23 | 17 | 4 | 1 | 0 | 0 | 117 |
| 8.51-11.50 | 0 | 0 | 0 | 3 | 2 | 4 | 3 | 4 | 17 | 36 | 78 | 25 | 6 | 2 | 5 | 2 | 187 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 6 | 15 | 56 | 5 | 2 | 4 | 2 | 2 | 94 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 7 | 35 | 9 | 1 | 0 | 1 | 0 | 58 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 4 | 0 | 1 | 0 | 0 | 0 | 13 |
| TOTAL | 0 | 0 | 0 | 8 | 9 | 8 | 5 | 15 | 62 | 94 | 204 | 56 | 15 | 7 | 8 | 4 | 495 |

STABILITY CLASS B

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 4.51- 5.50 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 11 | 2 | 4 | 2 | 0 | 0 | 0 | 0 | 23 |
| 5.51- 6.50 | 0 | 0 | 3 | 2 | 3 | 0 | 3 | 5 | 18 | 16 | 6 | 1 | 3 | 1 | 0 | 0 | 61 |
| 6.51- 8.50 | 1 | 1 | 7 | 3 | 2 | 2 | 8 | 11 | 13 | 10 | 11 | 8 | 0 | 1 | 0 | 1 | 79 |
| 8.51-11.50 | 0 | 0 | 0 | 11 | 1 | 1 | 0 | 2 | 1 | 7 | 20 | 10 | 5 | 1 | 3 | 0 | 62 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 12 | 3 | 2 | 1 | 1 | 2 | 25 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 1 | 5 | 2 | 0 | 2 | 0 | 0 | 14 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| TOTAL | 2 | 1 | 10 | 17 | 13 | 3 | 12 | 18 | 48 | 37 | 59 | 26 | 10 | 6 | 4 | 3 | 269 |

STABILITY CLASS C

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 1 | 0 | 0 | 8 |
| 3.51- 4.50 | 0 | 2 | 4 | 1 | 0 | 0 | 2 | 1 | 1 | 1 | 2 | 6 | 0 | 0 | 0 | 0 | 20 |
| 4.51- 5.50 | 3 | 4 | 9 | 4 | 3 | 2 | 0 | 2 | 9 | 8 | 12 | 7 | 9 | 5 | 2 | 1 | 80 |
| 5.51- 6.50 | 0 | 1 | 0 | 6 | 0 | 1 | 1 | 6 | 9 | 12 | 9 | 6 | 1 | 1 | 1 | 0 | 54 |
| 6.51- 8.50 | 0 | 0 | 6 | 7 | 8 | 1 | 0 | 4 | 8 | 4 | 14 | 5 | 4 | 2 | 2 | 1 | 66 |
| 8.51-11.50 | 0 | 0 | 2 | 6 | 2 | 3 | 1 | 1 | 1 | 1 | 13 | 5 | 3 | 3 | 3 | 0 | 44 |
| 11.51-14.50 | 0 | 0 | 0 | 3 | 3 | 1 | 0 | 0 | 0 | 2 | 8 | 3 | 0 | 3 | 0 | 0 | 23 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 2 | 0 | 1 | 0 | 0 | 8 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| TOTAL | 3 | 8 | 22 | 28 | 16 | 8 | 4 | 14 | 28 | 31 | 63 | 35 | 19 | 16 | 8 | 2 | 305 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 6/30/1998

*** 1ST SEMI ***

STABILITY CLASS D
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 1 | 3 | 2 | 0 | 1 | 3 | 1 | 3 | 2 | 6 | 4 | 6 | 7 | 7 | 4 | 50 |
| 2.51- 3.50 | 9 | 11 | 8 | 4 | 5 | 4 | 5 | 7 | 7 | 13 | 11 | 7 | 11 | 9 | 12 | 6 | 129 |
| 3.51- 4.50 | 9 | 8 | 11 | 7 | 3 | 2 | 3 | 4 | 20 | 10 | 17 | 14 | 10 | 7 | 12 | 4 | 141 |
| 4.51- 5.50 | 3 | 6 | 3 | 8 | 1 | 2 | 5 | 1 | 13 | 19 | 14 | 9 | 5 | 3 | 1 | 0 | 93 |
| 5.51- 6.50 | 1 | 1 | 5 | 11 | 4 | 2 | 0 | 1 | 10 | 8 | 8 | 7 | 3 | 0 | 1 | 0 | 62 |
| 6.51- 8.50 | 1 | 3 | 2 | 7 | 3 | 6 | 2 | 4 | 11 | 9 | 13 | 13 | 7 | 3 | 0 | 2 | 86 |
| 8.51-11.50 | 1 | 1 | 3 | 5 | 15 | 3 | 4 | 5 | 11 | 11 | 15 | 12 | 6 | 6 | 2 | 0 | 100 |
| 11.51-14.50 | 1 | 1 | 0 | 2 | 7 | 3 | 0 | 1 | 2 | 5 | 16 | 10 | 5 | 8 | 2 | 0 | 63 |
| 14.51-20.50 | 1 | 0 | 0 | 1 | 9 | 0 | 0 | 0 | 3 | 9 | 12 | 5 | 4 | 2 | 0 | 3 | 49 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 9 |
| TOTAL | 26 | 32 | 35 | 47 | 47 | 23 | 22 | 24 | 80 | 89 | 115 | 82 | 58 | 46 | 37 | 19 | 782 |

STABILITY CLASS E

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| 1.51- 2.50 | 7 | 5 | 3 | 1 | 1 | 0 | 0 | 0 | 3 | 1 | 4 | 4 | 10 | 3 | 10 | 3 | 55 |
| 2.51- 3.50 | 11 | 5 | 2 | 2 | 2 | 0 | 0 | 3 | 3 | 1 | 10 | 11 | 12 | 24 | 10 | 9 | 105 |
| 3.51- 4.50 | 6 | 11 | 1 | 1 | 0 | 0 | 0 | 1 | 3 | 3 | 8 | 8 | 9 | 8 | 8 | 7 | 74 |
| 4.51- 5.50 | 8 | 8 | 1 | 1 | 0 | 3 | 0 | 3 | 7 | 11 | 5 | 8 | 8 | 1 | 3 | 4 | 71 |
| 5.51- 6.50 | 3 | 3 | 3 | 1 | 1 | 0 | 1 | 1 | 3 | 7 | 22 | 8 | 6 | 2 | 0 | 2 | 63 |
| 6.51- 8.50 | 1 | 3 | 1 | 2 | 2 | 1 | 0 | 8 | 3 | 27 | 22 | 25 | 21 | 5 | 3 | 4 | 128 |
| 8.51-11.50 | 1 | 0 | 2 | 7 | 1 | 2 | 5 | 3 | 6 | 15 | 41 | 36 | 15 | 13 | 6 | 0 | 153 |
| 11.51-14.50 | 0 | 0 | 1 | 4 | 7 | 5 | 4 | 2 | 2 | 12 | 16 | 14 | 9 | 3 | 0 | 0 | 79 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 13 | 0 | 2 | 0 | 2 | 4 | 4 | 2 | 3 | 4 | 1 | 1 | 36 |
| >20.50 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 12 |
| TOTAL | 37 | 36 | 15 | 19 | 32 | 11 | 12 | 22 | 32 | 81 | 133 | 116 | 94 | 68 | 41 | 30 | 779 |

STABILITY CLASS F

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| 1.51- 2.50 | 3 | 5 | 3 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 4 | 11 | 9 | 12 | 8 | 59 |
| 2.51- 3.50 | 18 | 9 | 4 | 3 | 2 | 5 | 1 | 1 | 1 | 3 | 8 | 10 | 16 | 18 | 28 | 27 | 154 |
| 3.51- 4.50 | 17 | 5 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 4 | 6 | 10 | 8 | 16 | 29 | 26 | 127 |
| 4.51- 5.50 | 11 | 6 | 2 | 3 | 1 | 0 | 0 | 1 | 1 | 4 | 9 | 6 | 7 | 8 | 9 | 15 | 83 |
| 5.51- 6.50 | 7 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 7 | 15 | 9 | 16 | 7 | 5 | 7 | 79 |
| 6.51- 8.50 | 5 | 1 | 4 | 2 | 1 | 0 | 1 | 0 | 4 | 22 | 47 | 32 | 17 | 12 | 12 | 7 | 167 |
| 8.51-11.50 | 0 | 1 | 2 | 3 | 0 | 0 | 1 | 1 | 3 | 6 | 35 | 10 | 3 | 6 | 3 | 0 | 74 |
| 11.51-14.50 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 11 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 61 | 30 | 19 | 17 | 6 | 8 | 4 | 5 | 10 | 46 | 125 | 84 | 78 | 76 | 99 | 90 | 758 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 6/30/1998

*** 1ST SEMI ***

STABILITY CLASS G

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET

WIND MEASURED AT: 35.0 FEET

WIND THRESHOLD AT: .75 MPH

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|-----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| 1.51- 2.50 | 16 | 7 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 2 | 3 | 11 | 17 | 18 | 80 |
| 2.51- 3.50 | 55 | 25 | 6 | 1 | 0 | 0 | 0 | 2 | 1 | 2 | 5 | 8 | 9 | 14 | 42 | 61 | 231 |
| 3.51- 4.50 | 89 | 38 | 7 | 3 | 0 | 3 | 0 | 1 | 0 | 0 | 5 | 7 | 11 | 13 | 31 | 72 | 280 |
| 4.51- 5.50 | 63 | 35 | 6 | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 3 | 3 | 5 | 5 | 11 | 37 | 173 |
| 5.51- 6.50 | 35 | 33 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 7 | 1 | 2 | 3 | 4 | 16 | 106 |
| 6.51- 8.50 | 18 | 27 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 4 | 5 | 1 | 0 | 1 | 1 | 6 | 70 |
| 8.51-11.50 | 1 | 3 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 4 | 1 | 0 | 0 | 0 | 0 | 14 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 279 | 168 | 29 | 10 | 1 | 3 | 1 | 4 | 2 | 13 | 30 | 23 | 30 | 47 | 106 | 210 | 956 |

STABILITY CLASS ALL

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 8 |
| 1.51- 2.50 | 26 | 18 | 10 | 6 | 2 | 1 | 3 | 2 | 6 | 4 | 13 | 14 | 30 | 30 | 46 | 33 | 244 |
| 2.51- 3.50 | 93 | 51 | 21 | 11 | 9 | 9 | 6 | 13 | 12 | 20 | 34 | 37 | 50 | 66 | 92 | 103 | 627 |
| 3.51- 4.50 | 121 | 64 | 24 | 15 | 3 | 6 | 6 | 8 | 24 | 19 | 38 | 45 | 38 | 44 | 80 | 109 | 644 |
| 4.51- 5.50 | 89 | 59 | 21 | 17 | 7 | 7 | 7 | 7 | 41 | 47 | 47 | 35 | 34 | 22 | 26 | 57 | 523 |
| 5.51- 6.50 | 46 | 41 | 14 | 22 | 10 | 4 | 6 | 14 | 49 | 56 | 75 | 32 | 32 | 14 | 11 | 25 | 451 |
| 6.51- 8.50 | 26 | 35 | 26 | 26 | 19 | 14 | 12 | 37 | 65 | 100 | 135 | 101 | 53 | 25 | 18 | 21 | 713 |
| 8.51-11.50 | 3 | 5 | 10 | 36 | 22 | 13 | 14 | 16 | 39 | 78 | 206 | 99 | 38 | 31 | 22 | 2 | 634 |
| 11.51-14.50 | 1 | 1 | 2 | 11 | 23 | 10 | 4 | 3 | 11 | 34 | 111 | 38 | 18 | 19 | 5 | 4 | 295 |
| 14.51-20.50 | 1 | 0 | 0 | 2 | 24 | 0 | 2 | 0 | 12 | 22 | 60 | 20 | 8 | 9 | 2 | 4 | 166 |
| >20.50 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 1 | 3 | 11 | 9 | 1 | 3 | 6 | 0 | 0 | 39 |
| TOTAL | 408 | 275 | 130 | 146 | 124 | 64 | 60 | 102 | 262 | 391 | 729 | 422 | 304 | 266 | 303 | 358 | 4344 |

TOTAL NUMBER OF OBSERVATIONS: 4344

TOTAL NUMBER OF VALID OBSERVATIONS: 4344

TOTAL NUMBER OF MISSING OBSERVATIONS: 0

PERCENT DATA RECOVERY FOR THIS PERIOD: 100.0 %

MEAN WIND SPEED FOR THIS PERIOD: 6.8 MPH

TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

| A | B | C | D | E | F | G |
|-------|------|------|-------|-------|-------|-------|
| 11.40 | 6.19 | 7.02 | 18.00 | 17.93 | 17.45 | 22.01 |

DISTRIBUTION OF WIND DIRECTION VS STABILITY

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | CALM |
|-------|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| A | 0 | 0 | 0 | 8 | 9 | 8 | 5 | 15 | 62 | 94 | 204 | 56 | 15 | 7 | 8 | 4 | 0 |
| B | 2 | 1 | 10 | 17 | 13 | 3 | 12 | 18 | 48 | 37 | 59 | 26 | 10 | 6 | 4 | 3 | 0 |
| C | 3 | 8 | 22 | 28 | 16 | 8 | 4 | 14 | 28 | 31 | 63 | 35 | 19 | 16 | 8 | 2 | 0 |
| D | 26 | 32 | 35 | 47 | 47 | 23 | 22 | 24 | 80 | 89 | 115 | 82 | 58 | 46 | 37 | 19 | 0 |
| E | 37 | 36 | 15 | 19 | 32 | 11 | 12 | 22 | 32 | 81 | 133 | 116 | 94 | 68 | 41 | 30 | 0 |
| F | 61 | 30 | 19 | 17 | 6 | 8 | 4 | 5 | 10 | 46 | 125 | 84 | 78 | 76 | 99 | 90 | 0 |
| G | 279 | 168 | 29 | 10 | 1 | 3 | 1 | 4 | 2 | 13 | 30 | 23 | 30 | 47 | 106 | 210 | 0 |
| TOTAL | 408 | 275 | 130 | 146 | 124 | 64 | 60 | 102 | 262 | 391 | 729 | 422 | 304 | 266 | 303 | 358 | 0 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 7/01/1998 TO 9/30/1998

*** 3RD QTR ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4.51- 5.50 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 1 | 0 | 0 | 11 |
| 5.51- 6.50 | 0 | 0 | 1 | 0 | 2 | 1 | 1 | 4 | 4 | 6 | 10 | 2 | 2 | 1 | 1 | 1 | 36 |
| 6.51- 8.50 | 0 | 0 | 2 | 5 | 3 | 7 | 9 | 7 | 12 | 22 | 31 | 19 | 5 | 1 | 0 | 0 | 123 |
| 8.51-11.50 | 1 | 0 | 0 | 1 | 11 | 14 | 3 | 4 | 12 | 14 | 28 | 14 | 5 | 0 | 0 | 0 | 107 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 4 | 2 | 1 | 2 | 2 | 7 | 9 | 3 | 0 | 1 | 0 | 2 | 33 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 8 | 0 | 0 | 0 | 1 | 5 | 2 | 0 | 2 | 0 | 0 | 0 | 19 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 1 | 3 | 7 | 29 | 24 | 14 | 17 | 32 | 56 | 82 | 40 | 16 | 4 | 1 | 3 | 330 |

STABILITY CLASS B

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 6 |
| 4.51- 5.50 | 1 | 1 | 0 | 2 | 1 | 0 | 1 | 4 | 5 | 12 | 6 | 3 | 3 | 1 | 0 | 1 | 41 |
| 5.51- 6.50 | 0 | 1 | 1 | 0 | 1 | 3 | 3 | 3 | 20 | 12 | 4 | 6 | 4 | 1 | 1 | 1 | 61 |
| 6.51- 8.50 | 0 | 0 | 2 | 4 | 6 | 5 | 9 | 7 | 13 | 8 | 17 | 8 | 1 | 4 | 1 | 1 | 86 |
| 8.51-11.50 | 0 | 1 | 1 | 2 | 5 | 8 | 0 | 1 | 3 | 6 | 10 | 4 | 6 | 0 | 0 | 1 | 48 |
| 11.51-14.50 | 0 | 0 | 0 | 3 | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 11 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 5 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 3 | 4 | 11 | 21 | 17 | 13 | 16 | 42 | 40 | 39 | 22 | 16 | 6 | 2 | 5 | 258 |

STABILITY CLASS C

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 3 |
| 3.51- 4.50 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 0 | 3 | 0 | 4 | 3 | 1 | 3 | 0 | 1 | 23 |
| 4.51- 5.50 | 1 | 0 | 1 | 2 | 0 | 1 | 4 | 9 | 5 | 2 | 3 | 1 | 1 | 1 | 1 | 0 | 40 |
| 5.51- 6.50 | 2 | 1 | 0 | 0 | 3 | 1 | 2 | 3 | 9 | 3 | 6 | 2 | 1 | 0 | 0 | 0 | 33 |
| 6.51- 8.50 | 0 | 0 | 3 | 3 | 2 | 4 | 1 | 2 | 5 | 3 | 3 | 6 | 5 | 1 | 2 | 0 | 40 |
| 8.51-11.50 | 0 | 0 | 0 | 1 | 2 | 7 | 1 | 0 | 0 | 1 | 6 | 2 | 0 | 2 | 1 | 1 | 24 |
| 11.51-14.50 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 6 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 7 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 3 | 2 | 8 | 7 | 13 | 16 | 10 | 14 | 26 | 13 | 24 | 17 | 9 | 7 | 4 | 3 | 176 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 7/01/1998 TO 9/30/1998

*** 3RD QTR ***

STABILITY CLASS D

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 4 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 10 |
| 2.51- 3.50 | 2 | 2 | 4 | 2 | 1 | 2 | 1 | 2 | 4 | 1 | 5 | 3 | 3 | 2 | 3 | 4 | 41 |
| 3.51- 4.50 | 2 | 4 | 2 | 0 | 0 | 0 | 2 | 0 | 5 | 6 | 6 | 3 | 2 | 1 | 1 | 6 | 40 |
| 4.51- 5.50 | 1 | 1 | 1 | 4 | 0 | 0 | 1 | 3 | 8 | 7 | 3 | 6 | 1 | 1 | 2 | 1 | 40 |
| 5.51- 6.50 | 0 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 5 | 5 | 4 | 0 | 1 | 1 | 32 |
| 6.51- 8.50 | 6 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 3 | 3 | 12 | 4 | 6 | 4 | 2 | 5 | 57 |
| 8.51-11.50 | 4 | 1 | 4 | 4 | 6 | 4 | 3 | 0 | 4 | 3 | 11 | 8 | 1 | 5 | 3 | 2 | 63 |
| 11.51-14.50 | 4 | 0 | 0 | 2 | 6 | 0 | 3 | 1 | 1 | 6 | 9 | 7 | 2 | 1 | 1 | 1 | 44 |
| 14.51-20.50 | 1 | 5 | 2 | 2 | 15 | 4 | 1 | 2 | 1 | 8 | 8 | 1 | 0 | 0 | 0 | 1 | 51 |
| >20.50 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 |
| TOTAL | 24 | 18 | 18 | 18 | 33 | 17 | 15 | 11 | 30 | 35 | 59 | 37 | 19 | 14 | 13 | 24 | 385 |

STABILITY CLASS E

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 0 | 5 | 16 |
| 2.51- 3.50 | 5 | 0 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 2 | 2 | 7 | 4 | 6 | 6 | 6 | 44 |
| 3.51- 4.50 | 4 | 6 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 5 | 4 | 4 | 3 | 1 | 3 | 13 | 47 |
| 4.51- 5.50 | 6 | 7 | 1 | 0 | 1 | 1 | 2 | 1 | 0 | 3 | 8 | 10 | 2 | 2 | 3 | 1 | 48 |
| 5.51- 6.50 | 4 | 0 | 2 | 1 | 1 | 2 | 0 | 1 | 3 | 6 | 11 | 5 | 7 | 4 | 2 | 3 | 52 |
| 6.51- 8.50 | 8 | 5 | 7 | 4 | 3 | 4 | 4 | 3 | 4 | 10 | 22 | 15 | 6 | 6 | 0 | 2 | 103 |
| 8.51-11.50 | 6 | 4 | 3 | 5 | 7 | 5 | 3 | 4 | 10 | 10 | 23 | 16 | 5 | 2 | 0 | 4 | 107 |
| 11.51-14.50 | 3 | 2 | 2 | 4 | 15 | 5 | 0 | 1 | 0 | 4 | 7 | 3 | 2 | 3 | 1 | 1 | 53 |
| 14.51-20.50 | 2 | 0 | 1 | 2 | 12 | 2 | 1 | 2 | 2 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 29 |
| >20.50 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| TOTAL | 43 | 25 | 19 | 18 | 40 | 20 | 11 | 14 | 20 | 44 | 79 | 62 | 30 | 27 | 15 | 35 | 502 |

STABILITY CLASS F

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 3 | 4 | 2 | 2 | 18 |
| 2.51- 3.50 | 6 | 3 | 4 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 5 | 6 | 6 | 10 | 48 |
| 3.51- 4.50 | 12 | 7 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 4 | 1 | 5 | 3 | 6 | 6 | 48 |
| 4.51- 5.50 | 7 | 3 | 5 | 1 | 0 | 1 | 0 | 0 | 2 | 3 | 4 | 3 | 5 | 1 | 9 | 6 | 50 |
| 5.51- 6.50 | 10 | 5 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 11 | 4 | 2 | 2 | 1 | 2 | 42 |
| 6.51- 8.50 | 4 | 2 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 16 | 5 | 7 | 2 | 3 | 53 |
| 8.51-11.50 | 0 | 1 | 3 | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 4 | 2 | 2 | 1 | 1 | 23 |
| 11.51-14.50 | 1 | 0 | 2 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 6 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 3 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 42 | 22 | 21 | 8 | 2 | 2 | 0 | 2 | 7 | 9 | 32 | 34 | 27 | 26 | 27 | 30 | 291 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 7/01/1998 TO 9/30/1998

*** 3RD QTR ***

STABILITY CLASS G
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| 1.51- 2.50 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 2 | 2 | 5 | 16 |
| 2.51- 3.50 | 14 | 11 | 2 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 4 | 3 | 8 | 14 | 62 |
| 3.51- 4.50 | 19 | 9 | 2 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 2 | 1 | 5 | 3 | 14 | 60 |
| 4.51- 5.50 | 26 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 2 | 6 | 4 | 60 |
| 5.51- 6.50 | 9 | 6 | 4 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 28 |
| 6.51- 8.50 | 4 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 15 |
| 8.51-11.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 74 | 48 | 11 | 3 | 1 | 0 | 3 | 1 | 1 | 2 | 6 | 6 | 9 | 13 | 22 | 44 | 244 |

STABILITY CLASS ALL

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|-----|-----|----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 |
| 1.51- 2.50 | 11 | 3 | 2 | 0 | 0 | 2 | 1 | 1 | 1 | 3 | 3 | 2 | 5 | 8 | 4 | 14 | 60 |
| 2.51- 3.50 | 27 | 16 | 12 | 4 | 2 | 3 | 2 | 4 | 7 | 3 | 9 | 18 | 17 | 17 | 23 | 34 | 198 |
| 3.51- 4.50 | 37 | 27 | 9 | 4 | 2 | 1 | 6 | 1 | 11 | 12 | 23 | 13 | 12 | 13 | 13 | 41 | 225 |
| 4.51- 5.50 | 42 | 28 | 9 | 9 | 3 | 3 | 8 | 17 | 25 | 33 | 26 | 29 | 15 | 9 | 21 | 13 | 290 |
| 5.51- 6.50 | 25 | 16 | 12 | 5 | 9 | 9 | 8 | 13 | 38 | 29 | 47 | 24 | 21 | 8 | 7 | 13 | 284 |
| 6.51- 8.50 | 22 | 14 | 21 | 20 | 16 | 22 | 25 | 20 | 37 | 49 | 90 | 68 | 29 | 23 | 8 | 13 | 477 |
| 8.51-11.50 | 11 | 7 | 11 | 15 | 31 | 38 | 10 | 9 | 31 | 34 | 83 | 48 | 19 | 12 | 5 | 9 | 373 |
| 11.51-14.50 | 8 | 2 | 5 | 10 | 30 | 8 | 4 | 5 | 3 | 19 | 27 | 15 | 5 | 5 | 2 | 5 | 153 |
| 14.51-20.50 | 3 | 5 | 3 | 5 | 43 | 8 | 2 | 4 | 4 | 17 | 13 | 1 | 3 | 2 | 0 | 1 | 114 |
| >20.50 | 1 | 1 | 0 | 0 | 3 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 10 |
| TOTAL | 188 | 119 | 84 | 72 | 139 | 96 | 66 | 75 | 158 | 199 | 321 | 218 | 126 | 97 | 84 | 144 | 2186 |

TOTAL NUMBER OF OBSERVATIONS: 2208

TOTAL NUMBER OF VALID OBSERVATIONS: 2186

TOTAL NUMBER OF MISSING OBSERVATIONS: 22

PERCENT DATA RECOVERY FOR THIS PERIOD: 99.0 %

MEAN WIND SPEED FOR THIS PERIOD: 7.4 MPH

TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

A 15.10 B 11.80 C 8.05 D 17.61 E 22.96 F 13.31 G 11.16

DISTRIBUTION OF WIND DIRECTION VS STABILITY

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | CALM |
|-------|-----|-----|----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|----|-----|------|
| A | 1 | 1 | 3 | 7 | 29 | 24 | 14 | 17 | 32 | 56 | 82 | 40 | 16 | 4 | 1 | 3 | 0 |
| B | 1 | 3 | 4 | 11 | 21 | 17 | 13 | 16 | 42 | 40 | 39 | 22 | 16 | 6 | 2 | 5 | 0 |
| C | 3 | 2 | 8 | 7 | 13 | 16 | 10 | 14 | 26 | 13 | 24 | 17 | 9 | 7 | 4 | 3 | 0 |
| D | 24 | 18 | 18 | 18 | 33 | 17 | 15 | 11 | 30 | 35 | 59 | 37 | 19 | 14 | 13 | 24 | 0 |
| E | 43 | 25 | 19 | 18 | 40 | 20 | 11 | 14 | 20 | 44 | 79 | 62 | 30 | 27 | 15 | 35 | 0 |
| F | 42 | 22 | 21 | 8 | 2 | 2 | 0 | 2 | 7 | 9 | 32 | 34 | 27 | 26 | 27 | 30 | 0 |
| G | 74 | 48 | 11 | 3 | 1 | 0 | 3 | 1 | 1 | 2 | 6 | 6 | 9 | 13 | 22 | 44 | 0 |
| TOTAL | 188 | 119 | 84 | 72 | 139 | 96 | 66 | 75 | 158 | 199 | 321 | 218 | 126 | 97 | 84 | 144 | 0 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 10/01/1998 TO 12/31/1998

*** 4TH QTR ***

STABILITY CLASS A
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4.51- 5.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 5.51- 6.50 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 4 |
| 6.51- 8.50 | 0 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 0 | 0 | 0 | 10 |
| 8.51-11.50 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 0 | 1 | 0 | 4 | 2 | 0 | 0 | 0 | 1 | 13 |
| 11.51-14.50 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 6 | 0 | 0 | 1 | 0 | 0 | 12 |
| 14.51-20.50 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 | 1 | 0 | 4 | 5 | 1 | 22 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 0 | 3 | 5 | 3 | 7 | 1 | 0 | 1 | 1 | 6 | 18 | 6 | 0 | 5 | 5 | 2 | 63 |

STABILITY CLASS B

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 4 |
| 4.51- 5.50 | 1 | 1 | 0 | 1 | 0 | 2 | 1 | 1 | 1 | 1 | 2 | 0 | 0 | 3 | 1 | 0 | 15 |
| 5.51- 6.50 | 1 | 0 | 4 | 5 | 3 | 0 | 1 | 2 | 2 | 3 | 6 | 3 | 0 | 0 | 0 | 0 | 30 |
| 6.51- 8.50 | 1 | 0 | 1 | 6 | 5 | 2 | 2 | 6 | 1 | 2 | 4 | 4 | 1 | 0 | 0 | 1 | 36 |
| 8.51-11.50 | 3 | 1 | 3 | 2 | 1 | 1 | 3 | 0 | 1 | 2 | 0 | 1 | 1 | 0 | 0 | 2 | 21 |
| 11.51-14.50 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 2 | 0 | 9 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 5 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 6 | 2 | 10 | 15 | 12 | 5 | 7 | 9 | 6 | 10 | 15 | 9 | 4 | 3 | 4 | 3 | 120 |

STABILITY CLASS C

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|---|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 8 |
| 3.51- 4.50 | 0 | 3 | 3 | 2 | 1 | 0 | 3 | 2 | 4 | 3 | 1 | 4 | 1 | 1 | 2 | 1 | 31 |
| 4.51- 5.50 | 1 | 1 | 4 | 3 | 1 | 1 | 3 | 5 | 8 | 6 | 3 | 5 | 1 | 0 | 0 | 1 | 43 |
| 5.51- 6.50 | 0 | 0 | 3 | 0 | 1 | 0 | 1 | 3 | 5 | 5 | 2 | 6 | 1 | 0 | 0 | 1 | 28 |
| 6.51- 8.50 | 2 | 4 | 0 | 1 | 1 | 5 | 2 | 2 | 2 | 4 | 2 | 2 | 1 | 0 | 0 | 2 | 30 |
| 8.51-11.50 | 0 | 0 | 2 | 0 | 2 | 3 | 1 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 12 |
| 11.51-14.50 | 0 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 7 |
| 14.51-20.50 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 5 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 4 | 8 | 12 | 9 | 9 | 10 | 12 | 12 | 20 | 19 | 12 | 19 | 5 | 4 | 3 | 6 | 164 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 10/01/1998 TO 12/31/1998

*** 4TH QTR ***

STABILITY CLASS D
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 3 | 2 | 0 | 1 | 2 | 0 | 2 | 1 | 2 | 2 | 9 | 4 | 2 | 2 | 0 | 5 | 37 |
| 2.51- 3.50 | 5 | 4 | 4 | 2 | 2 | 1 | 3 | 4 | 9 | 18 | 20 | 13 | 8 | 6 | 4 | 5 | 108 |
| 3.51- 4.50 | 3 | 4 | 4 | 5 | 1 | 0 | 2 | 5 | 8 | 10 | 18 | 2 | 2 | 5 | 6 | 8 | 83 |
| 4.51- 5.50 | 0 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 7 | 5 | 5 | 2 | 2 | 0 | 1 | 2 | 34 |
| 5.51- 6.50 | 1 | 3 | 3 | 4 | 3 | 0 | 1 | 3 | 4 | 3 | 2 | 1 | 0 | 0 | 1 | 1 | 30 |
| 6.51- 8.50 | 1 | 2 | 3 | 1 | 0 | 4 | 4 | 4 | 2 | 4 | 3 | 2 | 3 | 1 | 1 | 1 | 36 |
| 8.51-11.50 | 1 | 0 | 0 | 2 | 3 | 3 | 2 | 0 | 1 | 4 | 10 | 3 | 2 | 0 | 2 | 0 | 33 |
| 11.51-14.50 | 1 | 0 | 0 | 1 | 6 | 4 | 1 | 1 | 0 | 1 | 1 | 0 | 2 | 2 | 0 | 0 | 20 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 11 | 4 | 0 | 0 | 2 | 1 | 5 | 1 | 0 | 2 | 1 | 0 | 27 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 15 | 18 | 17 | 17 | 29 | 17 | 15 | 19 | 35 | 48 | 73 | 28 | 21 | 18 | 16 | 22 | 408 |

STABILITY CLASS E

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|----|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 1.51- 2.50 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 4 | 5 | 6 | 4 | 3 | 29 |
| 2.51- 3.50 | 5 | 1 | 3 | 1 | 0 | 0 | 0 | 1 | 1 | 4 | 4 | 0 | 6 | 5 | 2 | 6 | 39 |
| 3.51- 4.50 | 2 | 3 | 1 | 2 | 1 | 0 | 0 | 1 | 3 | 2 | 9 | 4 | 2 | 4 | 4 | 3 | 41 |
| 4.51- 5.50 | 3 | 4 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 5 | 3 | 1 | 0 | 1 | 4 | 3 | 29 |
| 5.51- 6.50 | 2 | 3 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 6 | 3 | 3 | 3 | 1 | 3 | 28 |
| 6.51- 8.50 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 7 | 4 | 7 | 4 | 1 | 4 | 1 | 33 |
| 8.51-11.50 | 2 | 0 | 4 | 4 | 0 | 2 | 1 | 0 | 0 | 4 | 8 | 3 | 3 | 4 | 3 | 2 | 40 |
| 11.51-14.50 | 0 | 1 | 0 | 2 | 6 | 1 | 0 | 0 | 0 | 3 | 6 | 3 | 5 | 4 | 3 | 2 | 36 |
| 14.51-20.50 | 0 | 0 | 0 | 2 | 8 | 0 | 1 | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 16 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 15 | 15 | 12 | 15 | 16 | 6 | 5 | 3 | 7 | 26 | 45 | 25 | 28 | 29 | 25 | 23 | 295 |

STABILITY CLASS F

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| 1.51- 2.50 | 1 | 1 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 4 | 1 | 5 | 4 | 5 | 1 | 29 |
| 2.51- 3.50 | 9 | 3 | 1 | 4 | 1 | 0 | 2 | 0 | 2 | 1 | 4 | 9 | 4 | 15 | 8 | 8 | 71 |
| 3.51- 4.50 | 6 | 4 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 2 | 8 | 3 | 4 | 7 | 42 |
| 4.51- 5.50 | 5 | 2 | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 4 | 5 | 4 | 4 | 4 | 33 |
| 5.51- 6.50 | 2 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 5 | 9 | 5 | 2 | 4 | 4 | 5 | 41 |
| 6.51- 8.50 | 4 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 10 | 8 | 3 | 3 | 3 | 10 | 50 |
| 8.51-11.50 | 4 | 4 | 4 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 11 | 30 |
| 11.51-14.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 31 | 19 | 12 | 7 | 5 | 1 | 3 | 2 | 6 | 12 | 33 | 30 | 29 | 33 | 30 | 47 | 300 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 10/01/1998 TO 12/31/1998

*** 4TH QTR ***

STABILITY CLASS G

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 4 |
| 1.51- 2.50 | 12 | 7 | 1 | 2 | 0 | 0 | 1 | 2 | 1 | 1 | 4 | 3 | 4 | 12 | 9 | 28 | 87 |
| 2.51- 3.50 | 61 | 27 | 6 | 0 | 3 | 2 | 1 | 0 | 2 | 0 | 5 | 6 | 7 | 17 | 38 | 65 | 240 |
| 3.51- 4.50 | 85 | 21 | 8 | 1 | 2 | 1 | 0 | 0 | 1 | 2 | 3 | 4 | 4 | 14 | 34 | 51 | 231 |
| 4.51- 5.50 | 50 | 28 | 3 | 4 | 0 | 1 | 0 | 1 | 1 | 1 | 2 | 1 | 2 | 3 | 9 | 33 | 139 |
| 5.51- 6.50 | 28 | 14 | 3 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 19 | 73 |
| 6.51- 8.50 | 29 | 15 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 10 | 60 |
| 8.51-11.50 | 10 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 20 |
| 11.51-14.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 275 | 119 | 24 | 9 | 5 | 5 | 3 | 4 | 5 | 4 | 14 | 14 | 19 | 51 | 93 | 211 | 855 |

STABILITY CLASS ALL

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 10 |
| 1.51- 2.50 | 17 | 10 | 4 | 4 | 3 | 2 | 5 | 3 | 5 | 4 | 18 | 12 | 16 | 24 | 18 | 37 | 182 |
| 2.51- 3.50 | 80 | 35 | 14 | 7 | 7 | 3 | 8 | 5 | 14 | 23 | 34 | 30 | 26 | 44 | 52 | 84 | 466 |
| 3.51- 4.50 | 96 | 35 | 19 | 10 | 5 | 1 | 5 | 9 | 17 | 18 | 36 | 16 | 18 | 27 | 50 | 70 | 432 |
| 4.51- 5.50 | 60 | 39 | 14 | 9 | 3 | 7 | 5 | 8 | 19 | 18 | 16 | 13 | 10 | 11 | 19 | 43 | 294 |
| 5.51- 6.50 | 34 | 22 | 15 | 11 | 9 | 1 | 5 | 8 | 13 | 18 | 26 | 18 | 7 | 10 | 8 | 29 | 234 |
| 6.51- 8.50 | 37 | 25 | 9 | 11 | 10 | 11 | 8 | 14 | 6 | 21 | 25 | 26 | 12 | 6 | 9 | 25 | 255 |
| 8.51-11.50 | 20 | 12 | 13 | 10 | 9 | 10 | 7 | 1 | 4 | 11 | 24 | 9 | 7 | 4 | 7 | 21 | 169 |
| 11.51-14.50 | 1 | 1 | 2 | 7 | 17 | 6 | 1 | 2 | 0 | 7 | 15 | 4 | 7 | 7 | 6 | 4 | 87 |
| 14.51-20.50 | 1 | 1 | 2 | 4 | 20 | 4 | 1 | 0 | 2 | 5 | 15 | 2 | 1 | 9 | 7 | 1 | 75 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 346 | 184 | 92 | 75 | 83 | 45 | 45 | 50 | 80 | 125 | 210 | 131 | 106 | 143 | 176 | 314 | 2205 |

TOTAL NUMBER OF OBSERVATIONS: 2208

TOTAL NUMBER OF VALID OBSERVATIONS: 2205

TOTAL NUMBER OF MISSING OBSERVATIONS: 3

PERCENT DATA RECOVERY FOR THIS PERIOD: 99.9 %

MEAN WIND SPEED FOR THIS PERIOD: 5.6 MPH

TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

| A | B | C | D | E | F | G |
|------|------|------|-------|-------|-------|-------|
| 2.86 | 5.44 | 7.44 | 18.50 | 13.38 | 13.61 | 38.78 |

DISTRIBUTION OF WIND DIRECTION VS STABILITY

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | CALM |
|-------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|------|
| A | 0 | 3 | 5 | 3 | 7 | 1 | 0 | 1 | 1 | 6 | 18 | 6 | 0 | 5 | 5 | 2 | 0 |
| B | 6 | 2 | 10 | 15 | 12 | 5 | 7 | 9 | 6 | 10 | 15 | 9 | 4 | 3 | 4 | 3 | 0 |
| C | 4 | 8 | 12 | 9 | 9 | 10 | 12 | 12 | 20 | 19 | 12 | 19 | 5 | 4 | 3 | 6 | 0 |
| D | 15 | 18 | 17 | 17 | 29 | 17 | 15 | 19 | 35 | 48 | 73 | 28 | 21 | 18 | 16 | 22 | 0 |
| E | 15 | 15 | 12 | 15 | 16 | 6 | 5 | 3 | 7 | 26 | 45 | 25 | 28 | 29 | 25 | 23 | 0 |
| F | 31 | 19 | 12 | 7 | 5 | 1 | 3 | 2 | 6 | 12 | 33 | 30 | 29 | 33 | 30 | 47 | 0 |
| G | 275 | 119 | 24 | 9 | 5 | 5 | 3 | 4 | 5 | 4 | 14 | 14 | 19 | 51 | 93 | 211 | 0 |
| TOTAL | 346 | 184 | 92 | 75 | 83 | 45 | 45 | 50 | 80 | 125 | 210 | 131 | 106 | 143 | 176 | 314 | 0 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 7/01/1998 TO 12/31/1998

*** 2ND SEMI ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4.51- 5.50 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 1 | 0 | 0 | 12 |
| 5.51- 6.50 | 0 | 0 | 1 | 0 | 4 | 1 | 1 | 4 | 4 | 7 | 11 | 2 | 2 | 1 | 1 | 1 | 40 |
| 6.51- 8.50 | 0 | 0 | 2 | 8 | 5 | 7 | 9 | 7 | 12 | 22 | 33 | 22 | 5 | 1 | 0 | 0 | 133 |
| 8.51-11.50 | 1 | 2 | 0 | 1 | 13 | 15 | 3 | 4 | 13 | 14 | 32 | 16 | 5 | 0 | 0 | 1 | 120 |
| 11.51-14.50 | 0 | 0 | 2 | 0 | 5 | 2 | 1 | 3 | 2 | 8 | 15 | 3 | 0 | 2 | 0 | 2 | 45 |
| 14.51-20.50 | 0 | 1 | 2 | 1 | 8 | 0 | 0 | 0 | 1 | 9 | 6 | 1 | 2 | 4 | 5 | 1 | 41 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 1 | 4 | 8 | 10 | 36 | 25 | 14 | 18 | 33 | 62 | 100 | 46 | 16 | 9 | 6 | 5 | 393 |

STABILITY CLASS B

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 10 |
| 4.51- 5.50 | 2 | 2 | 0 | 3 | 1 | 2 | 2 | 5 | 6 | 13 | 8 | 3 | 3 | 4 | 1 | 1 | 56 |
| 5.51- 6.50 | 1 | 1 | 5 | 5 | 4 | 3 | 4 | 5 | 22 | 15 | 10 | 9 | 4 | 1 | 1 | 1 | 91 |
| 6.51- 8.50 | 1 | 0 | 3 | 10 | 11 | 7 | 11 | 13 | 14 | 10 | 21 | 12 | 2 | 4 | 1 | 2 | 122 |
| 8.51-11.50 | 3 | 2 | 4 | 4 | 6 | 9 | 3 | 1 | 4 | 8 | 10 | 5 | 7 | 0 | 0 | 3 | 69 |
| 11.51-14.50 | 0 | 0 | 0 | 3 | 8 | 0 | 0 | 0 | 0 | 3 | 1 | 2 | 1 | 0 | 2 | 0 | 20 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 1 | 0 | 10 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 7 | 5 | 14 | 26 | 33 | 22 | 20 | 25 | 48 | 50 | 54 | 31 | 20 | 9 | 6 | 8 | 378 |

STABILITY CLASS C

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 1 | 3 | 2 | 1 | 0 | 0 | 11 |
| 3.51- 4.50 | 0 | 4 | 5 | 3 | 2 | 1 | 5 | 2 | 7 | 3 | 5 | 7 | 2 | 4 | 2 | 2 | 54 |
| 4.51- 5.50 | 2 | 1 | 5 | 5 | 1 | 2 | 7 | 14 | 17 | 11 | 5 | 8 | 2 | 1 | 1 | 1 | 83 |
| 5.51- 6.50 | 2 | 1 | 3 | 0 | 4 | 1 | 3 | 6 | 14 | 8 | 8 | 8 | 2 | 0 | 0 | 1 | 61 |
| 6.51- 8.50 | 2 | 4 | 3 | 4 | 3 | 9 | 3 | 4 | 7 | 7 | 5 | 8 | 6 | 1 | 2 | 2 | 70 |
| 8.51-11.50 | 0 | 0 | 2 | 1 | 4 | 10 | 2 | 0 | 1 | 2 | 8 | 2 | 0 | 2 | 1 | 1 | 36 |
| 11.51-14.50 | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 1 | 2 | 13 |
| 14.51-20.50 | 1 | 0 | 0 | 1 | 6 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 0 | 0 | 12 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 7 | 10 | 20 | 16 | 22 | 26 | 22 | 26 | 46 | 32 | 36 | 36 | 14 | 11 | 7 | 9 | 340 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 7/01/1998 TO 12/31/1998

*** 2ND SEMI ***

STABILITY CLASS D
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 7 | 2 | 2 | 1 | 2 | 1 | 2 | 1 | 3 | 2 | 9 | 4 | 2 | 2 | 0 | 7 | 47 |
| 2.51- 3.50 | 7 | 6 | 8 | 4 | 3 | 3 | 4 | 6 | 13 | 19 | 25 | 16 | 11 | 8 | 7 | 9 | 149 |
| 3.51- 4.50 | 5 | 8 | 6 | 5 | 1 | 0 | 4 | 5 | 13 | 16 | 24 | 5 | 4 | 6 | 7 | 14 | 123 |
| 4.51- 5.50 | 1 | 4 | 4 | 5 | 1 | 1 | 1 | 4 | 15 | 12 | 8 | 8 | 3 | 1 | 3 | 3 | 74 |
| 5.51- 6.50 | 1 | 6 | 5 | 6 | 4 | 2 | 3 | 4 | 6 | 4 | 7 | 6 | 4 | 0 | 2 | 2 | 62 |
| 6.51- 8.50 | 7 | 4 | 4 | 3 | 2 | 6 | 6 | 5 | 5 | 7 | 15 | 6 | 9 | 5 | 3 | 6 | 93 |
| 8.51-11.50 | 5 | 1 | 4 | 6 | 9 | 7 | 5 | 0 | 5 | 7 | 21 | 11 | 3 | 5 | 5 | 2 | 96 |
| 11.51-14.50 | 5 | 0 | 0 | 3 | 12 | 4 | 4 | 2 | 1 | 7 | 10 | 7 | 4 | 3 | 1 | 1 | 64 |
| 14.51-20.50 | 1 | 5 | 2 | 2 | 26 | 8 | 1 | 2 | 3 | 9 | 13 | 2 | 0 | 2 | 1 | 1 | 78 |
| >20.50 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 |
| TOTAL | 39 | 36 | 35 | 35 | 62 | 34 | 30 | 30 | 65 | 83 | 132 | 65 | 40 | 32 | 29 | 46 | 793 |

STABILITY CLASS E

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 1.51- 2.50 | 5 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 6 | 6 | 8 | 4 | 8 | 45 |
| 2.51- 3.50 | 10 | 1 | 4 | 2 | 0 | 1 | 0 | 3 | 2 | 6 | 6 | 7 | 10 | 11 | 8 | 12 | 83 |
| 3.51- 4.50 | 6 | 9 | 3 | 3 | 1 | 0 | 1 | 1 | 3 | 7 | 13 | 8 | 5 | 5 | 7 | 16 | 88 |
| 4.51- 5.50 | 9 | 11 | 1 | 0 | 1 | 3 | 3 | 1 | 2 | 8 | 11 | 11 | 2 | 3 | 7 | 4 | 77 |
| 5.51- 6.50 | 6 | 3 | 3 | 2 | 1 | 2 | 1 | 1 | 3 | 7 | 17 | 8 | 10 | 7 | 3 | 6 | 80 |
| 6.51- 8.50 | 8 | 6 | 9 | 4 | 4 | 4 | 4 | 4 | 4 | 17 | 26 | 22 | 10 | 7 | 4 | 3 | 136 |
| 8.51-11.50 | 8 | 4 | 7 | 9 | 7 | 7 | 4 | 4 | 10 | 14 | 31 | 19 | 8 | 6 | 3 | 6 | 147 |
| 11.51-14.50 | 3 | 3 | 2 | 6 | 21 | 6 | 0 | 1 | 0 | 7 | 13 | 6 | 7 | 7 | 4 | 3 | 89 |
| 14.51-20.50 | 2 | 0 | 1 | 4 | 20 | 2 | 2 | 2 | 2 | 3 | 5 | 0 | 0 | 2 | 0 | 0 | 45 |
| >20.50 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| TOTAL | 58 | 40 | 31 | 33 | 56 | 26 | 16 | 17 | 27 | 70 | 124 | 87 | 58 | 56 | 40 | 58 | 797 |

STABILITY CLASS F

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|----|-----|----|-----|---|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 2 |
| 1.51- 2.50 | 3 | 2 | 2 | 0 | 1 | 2 | 1 | 1 | 1 | 2 | 5 | 1 | 8 | 8 | 7 | 3 | 47 |
| 2.51- 3.50 | 15 | 6 | 5 | 4 | 2 | 0 | 2 | 0 | 3 | 1 | 5 | 14 | 9 | 21 | 14 | 18 | 119 |
| 3.51- 4.50 | 18 | 11 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | 9 | 3 | 13 | 6 | 10 | 13 | 90 |
| 4.51- 5.50 | 12 | 5 | 8 | 1 | 1 | 1 | 0 | 0 | 2 | 3 | 5 | 7 | 10 | 5 | 13 | 10 | 83 |
| 5.51- 6.50 | 12 | 7 | 3 | 2 | 0 | 0 | 0 | 0 | 2 | 6 | 20 | 9 | 4 | 6 | 5 | 7 | 83 |
| 6.51- 8.50 | 8 | 5 | 4 | 2 | 1 | 0 | 0 | 0 | 1 | 7 | 15 | 24 | 8 | 10 | 5 | 13 | 103 |
| 8.51-11.50 | 4 | 5 | 7 | 4 | 1 | 0 | 0 | 1 | 2 | 0 | 5 | 4 | 3 | 2 | 3 | 12 | 53 |
| 11.51-14.50 | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 8 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 3 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 73 | 41 | 33 | 15 | 7 | 3 | 3 | 4 | 13 | 21 | 65 | 64 | 56 | 59 | 57 | 77 | 591 |

ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 7/01/1998 TO 12/31/1998

*** 2ND SEMI ***

STABILITY CLASS G
 STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 6 |
| 1.51- 2.50 | 13 | 9 | 1 | 2 | 0 | 0 | 2 | 2 | 1 | 2 | 5 | 3 | 5 | 14 | 11 | 33 | 103 |
| 2.51- 3.50 | 75 | 38 | 8 | 1 | 3 | 2 | 2 | 0 | 3 | 0 | 6 | 8 | 11 | 20 | 46 | 79 | 302 |
| 3.51- 4.50 | 104 | 30 | 10 | 3 | 2 | 1 | 1 | 0 | 1 | 2 | 5 | 6 | 5 | 19 | 37 | 65 | 291 |
| 4.51- 5.50 | 76 | 43 | 4 | 4 | 0 | 1 | 0 | 1 | 1 | 2 | 4 | 3 | 3 | 5 | 15 | 37 | 199 |
| 5.51- 6.50 | 37 | 20 | 7 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 3 | 24 | 101 |
| 6.51- 8.50 | 33 | 20 | 5 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 | 12 | 75 |
| 8.51-11.50 | 10 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 5 | 21 |
| 11.51-14.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 349 | 167 | 35 | 12 | 6 | 5 | 6 | 5 | 6 | 6 | 20 | 20 | 28 | 64 | 115 | 255 | 1099 |

STABILITY CLASS ALL

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 1 | 4 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 1 | 0 | 12 |
| 1.51- 2.50 | 28 | 13 | 6 | 4 | 3 | 4 | 6 | 4 | 6 | 7 | 21 | 14 | 21 | 32 | 22 | 51 | 242 |
| 2.51- 3.50 | 107 | 51 | 26 | 11 | 9 | 6 | 10 | 9 | 21 | 26 | 43 | 48 | 43 | 61 | 75 | 118 | 664 |
| 3.51- 4.50 | 133 | 62 | 28 | 14 | 7 | 2 | 11 | 10 | 28 | 30 | 59 | 29 | 30 | 40 | 63 | 111 | 657 |
| 4.51- 5.50 | 102 | 67 | 23 | 18 | 6 | 10 | 13 | 25 | 44 | 51 | 42 | 42 | 25 | 20 | 40 | 56 | 584 |
| 5.51- 6.50 | 59 | 38 | 27 | 16 | 18 | 10 | 13 | 21 | 51 | 47 | 73 | 42 | 28 | 18 | 15 | 42 | 518 |
| 6.51- 8.50 | 59 | 39 | 30 | 31 | 26 | 33 | 33 | 34 | 43 | 70 | 115 | 94 | 41 | 29 | 17 | 38 | 732 |
| 8.51-11.50 | 31 | 19 | 24 | 25 | 40 | 48 | 17 | 10 | 35 | 45 | 107 | 57 | 26 | 16 | 12 | 30 | 542 |
| 11.51-14.50 | 9 | 3 | 7 | 17 | 47 | 14 | 5 | 7 | 3 | 26 | 42 | 19 | 12 | 12 | 8 | 9 | 240 |
| 14.51-20.50 | 4 | 6 | 5 | 9 | 63 | 12 | 3 | 4 | 6 | 22 | 28 | 3 | 4 | 11 | 7 | 2 | 189 |
| >20.50 | 1 | 1 | 0 | 0 | 3 | 2 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 11 |
| TOTAL | 534 | 303 | 176 | 147 | 222 | 141 | 111 | 125 | 238 | 324 | 531 | 349 | 232 | 240 | 260 | 458 | 4391 |

TOTAL NUMBER OF OBSERVATIONS: 4416
 TOTAL NUMBER OF VALID OBSERVATIONS: 4391
 TOTAL NUMBER OF MISSING OBSERVATIONS: 25
 PERCENT DATA RECOVERY FOR THIS PERIOD: 99.4 %
 MEAN WIND SPEED FOR THIS PERIOD: 6.5 MPH
 TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

A 8.95 B 8.61 C 7.74 D 18.06 E 18.15 F 13.46 G 25.03

DISTRIBUTION OF WIND DIRECTION VS STABILITY

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | CALM |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| A | 1 | 4 | 8 | 10 | 36 | 25 | 14 | 18 | 33 | 62 | 100 | 46 | 16 | 9 | 6 | 5 | 0 |
| B | 7 | 5 | 14 | 26 | 33 | 22 | 20 | 25 | 48 | 50 | 54 | 31 | 20 | 9 | 6 | 8 | 0 |
| C | 7 | 10 | 20 | 16 | 22 | 26 | 22 | 26 | 46 | 32 | 36 | 36 | 14 | 11 | 7 | 9 | 0 |
| D | 39 | 36 | 35 | 35 | 62 | 34 | 30 | 30 | 65 | 83 | 132 | 65 | 40 | 32 | 29 | 46 | 0 |
| E | 58 | 40 | 31 | 33 | 56 | 26 | 16 | 17 | 27 | 70 | 124 | 87 | 58 | 56 | 40 | 58 | 0 |
| F | 73 | 41 | 33 | 15 | 7 | 3 | 3 | 4 | 13 | 21 | 65 | 64 | 56 | 59 | 57 | 77 | 0 |
| G | 349 | 167 | 35 | 12 | 6 | 5 | 6 | 5 | 6 | 6 | 20 | 20 | 28 | 64 | 115 | 255 | 0 |
| TOTAL | 534 | 303 | 176 | 147 | 222 | 141 | 111 | 125 | 238 | 324 | 531 | 349 | 232 | 240 | 260 | 458 | 0 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 12/31/1998

*** ANNUAL ***

STABILITY CLASS A

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| 4.51- 5.50 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 2 | 1 | 0 | 0 | 12 |
| 5.51- 6.50 | 0 | 0 | 1 | 1 | 6 | 1 | 2 | 5 | 11 | 12 | 19 | 2 | 3 | 1 | 1 | 1 | 66 |
| 6.51- 8.50 | 0 | 0 | 2 | 12 | 8 | 11 | 10 | 17 | 38 | 46 | 56 | 39 | 9 | 2 | 0 | 0 | 250 |
| 8.51-11.50 | 1 | 2 | 0 | 4 | 15 | 19 | 6 | 8 | 30 | 50 | 110 | 41 | 11 | 2 | 5 | 3 | 307 |
| 11.51-14.50 | 0 | 0 | 2 | 0 | 7 | 2 | 1 | 3 | 8 | 23 | 71 | 8 | 2 | 6 | 2 | 4 | 139 |
| 14.51-20.50 | 0 | 1 | 2 | 1 | 8 | 0 | 0 | 0 | 6 | 16 | 41 | 10 | 3 | 4 | 6 | 1 | 99 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 7 | 5 | 0 | 1 | 0 | 0 | 0 | 14 |
| TOTAL | 1 | 4 | 8 | 18 | 45 | 33 | 19 | 33 | 95 | 156 | 304 | 102 | 31 | 16 | 14 | 9 | 888 |

STABILITY CLASS B

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|---|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.51- 4.50 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 12 |
| 4.51- 5.50 | 3 | 2 | 0 | 3 | 3 | 2 | 3 | 5 | 17 | 15 | 12 | 5 | 3 | 4 | 1 | 1 | 79 |
| 5.51- 6.50 | 1 | 1 | 8 | 7 | 7 | 3 | 7 | 10 | 40 | 31 | 16 | 10 | 7 | 2 | 1 | 1 | 152 |
| 6.51- 8.50 | 2 | 1 | 10 | 13 | 13 | 9 | 19 | 24 | 27 | 20 | 32 | 20 | 2 | 5 | 1 | 3 | 201 |
| 8.51-11.50 | 3 | 2 | 4 | 15 | 7 | 10 | 3 | 3 | 5 | 15 | 30 | 15 | 12 | 1 | 3 | 3 | 131 |
| 11.51-14.50 | 0 | 0 | 0 | 3 | 11 | 0 | 0 | 0 | 1 | 3 | 13 | 5 | 3 | 1 | 3 | 2 | 45 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 2 | 2 | 7 | 2 | 2 | 2 | 1 | 0 | 24 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| TOTAL | 9 | 6 | 24 | 43 | 46 | 25 | 32 | 43 | 96 | 87 | 113 | 57 | 30 | 15 | 10 | 11 | 647 |

STABILITY CLASS C

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.51- 3.50 | 0 | 1 | 2 | 1 | 1 | 0 | 2 | 0 | 0 | 1 | 1 | 4 | 4 | 2 | 0 | 0 | 19 |
| 3.51- 4.50 | 0 | 6 | 9 | 4 | 2 | 1 | 7 | 3 | 8 | 4 | 7 | 13 | 2 | 4 | 2 | 2 | 74 |
| 4.51- 5.50 | 5 | 5 | 14 | 9 | 4 | 4 | 7 | 16 | 26 | 19 | 17 | 15 | 11 | 6 | 3 | 2 | 163 |
| 5.51- 6.50 | 2 | 2 | 3 | 6 | 4 | 2 | 4 | 12 | 23 | 20 | 17 | 14 | 3 | 1 | 1 | 1 | 115 |
| 6.51- 8.50 | 2 | 4 | 9 | 11 | 11 | 10 | 3 | 8 | 15 | 11 | 19 | 13 | 10 | 3 | 4 | 3 | 136 |
| 8.51-11.50 | 0 | 0 | 4 | 7 | 6 | 13 | 3 | 1 | 2 | 3 | 21 | 7 | 3 | 5 | 4 | 1 | 80 |
| 11.51-14.50 | 0 | 0 | 1 | 5 | 4 | 3 | 0 | 0 | 0 | 3 | 11 | 3 | 0 | 3 | 1 | 2 | 36 |
| 14.51-20.50 | 1 | 0 | 0 | 1 | 6 | 1 | 0 | 0 | 0 | 1 | 5 | 2 | 0 | 3 | 0 | 0 | 20 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| TOTAL | 10 | 18 | 42 | 44 | 38 | 34 | 26 | 40 | 74 | 63 | 99 | 71 | 33 | 27 | 15 | 11 | 645 |



ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 12/31/1998

*** ANNUAL ***

STABILITY CLASS D

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|-----|-----|----|-----|-----|-----|-----|-----|----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1.51- 2.50 | 7 | 3 | 5 | 3 | 2 | 2 | 5 | 2 | 6 | 4 | 15 | 8 | 8 | 9 | 7 | 11 | 97 |
| 2.51- 3.50 | 16 | 17 | 16 | 8 | 8 | 7 | 9 | 13 | 20 | 32 | 36 | 23 | 22 | 17 | 19 | 15 | 278 |
| 3.51- 4.50 | 14 | 16 | 17 | 12 | 4 | 2 | 7 | 9 | 33 | 26 | 41 | 19 | 14 | 13 | 19 | 18 | 264 |
| 4.51- 5.50 | 4 | 10 | 7 | 13 | 2 | 3 | 6 | 5 | 28 | 31 | 22 | 17 | 8 | 4 | 4 | 3 | 167 |
| 5.51- 6.50 | 2 | 7 | 10 | 17 | 8 | 4 | 3 | 5 | 16 | 12 | 15 | 13 | 7 | 0 | 3 | 2 | 124 |
| 6.51- 8.50 | 8 | 7 | 6 | 10 | 5 | 12 | 8 | 9 | 16 | 16 | 28 | 19 | 16 | 8 | 3 | 8 | 179 |
| 8.51-11.50 | 6 | 2 | 7 | 11 | 24 | 10 | 9 | 5 | 16 | 18 | 36 | 23 | 9 | 11 | 7 | 2 | 196 |
| 11.51-14.50 | 6 | 1 | 0 | 5 | 19 | 7 | 4 | 3 | 3 | 12 | 26 | 17 | 9 | 11 | 3 | 1 | 127 |
| 14.51-20.50 | 2 | 5 | 2 | 3 | 35 | 8 | 1 | 2 | 6 | 18 | 25 | 7 | 4 | 4 | 1 | 4 | 127 |
| >20.50 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 1 | 3 | 3 | 1 | 1 | 1 | 0 | 1 | 16 |
| TOTAL | 65 | 68 | 70 | 82 | 109 | 57 | 52 | 54 | 145 | 172 | 247 | 147 | 98 | 78 | 66 | 65 | 1575 |

STABILITY CLASS E

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 7 |
| 1.51- 2.50 | 12 | 5 | 4 | 2 | 1 | 1 | 1 | 0 | 4 | 2 | 6 | 10 | 16 | 11 | 14 | 11 | 100 |
| 2.51- 3.50 | 21 | 6 | 6 | 4 | 2 | 1 | 0 | 6 | 5 | 7 | 16 | 18 | 22 | 35 | 18 | 21 | 188 |
| 3.51- 4.50 | 12 | 20 | 4 | 4 | 1 | 0 | 1 | 2 | 6 | 10 | 21 | 16 | 14 | 13 | 15 | 23 | 162 |
| 4.51- 5.50 | 17 | 19 | 2 | 1 | 1 | 6 | 3 | 4 | 9 | 19 | 16 | 19 | 10 | 4 | 10 | 8 | 148 |
| 5.51- 6.50 | 9 | 6 | 6 | 3 | 2 | 2 | 2 | 2 | 6 | 14 | 39 | 16 | 16 | 9 | 3 | 8 | 143 |
| 6.51- 8.50 | 9 | 9 | 10 | 6 | 6 | 5 | 4 | 12 | 7 | 44 | 48 | 47 | 31 | 12 | 7 | 7 | 264 |
| 8.51-11.50 | 9 | 4 | 9 | 16 | 8 | 9 | 9 | 7 | 16 | 29 | 72 | 55 | 23 | 19 | 9 | 6 | 300 |
| 11.51-14.50 | 3 | 3 | 3 | 10 | 28 | 11 | 4 | 3 | 2 | 19 | 29 | 20 | 16 | 10 | 4 | 3 | 168 |
| 14.51-20.50 | 2 | 0 | 1 | 4 | 33 | 2 | 4 | 2 | 4 | 7 | 9 | 2 | 3 | 6 | 1 | 1 | 81 |
| >20.50 | 1 | 1 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 0 | 15 |
| TOTAL | 95 | 76 | 46 | 52 | 88 | 37 | 28 | 39 | 59 | 151 | 257 | 203 | 152 | 124 | 81 | 88 | 1576 |

STABILITY CLASS F

| SPEED
(MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|----------------|-----|-----|----|-----|----|-----|----|-----|----|-----|-----|-----|-----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 5 |
| 1.51- 2.50 | 6 | 7 | 5 | 1 | 2 | 2 | 1 | 1 | 1 | 2 | 7 | 5 | 19 | 17 | 19 | 11 | 106 |
| 2.51- 3.50 | 33 | 15 | 9 | 7 | 4 | 5 | 3 | 1 | 4 | 4 | 13 | 24 | 25 | 39 | 42 | 45 | 273 |
| 3.51- 4.50 | 35 | 16 | 3 | 2 | 0 | 1 | 1 | 2 | 2 | 6 | 15 | 13 | 21 | 22 | 39 | 39 | 217 |
| 4.51- 5.50 | 23 | 11 | 10 | 4 | 2 | 1 | 0 | 1 | 3 | 7 | 14 | 13 | 17 | 13 | 22 | 25 | 166 |
| 5.51- 6.50 | 19 | 10 | 4 | 2 | 0 | 1 | 0 | 0 | 3 | 13 | 35 | 18 | 20 | 13 | 10 | 14 | 162 |
| 6.51- 8.50 | 13 | 6 | 8 | 4 | 2 | 0 | 1 | 0 | 5 | 29 | 62 | 56 | 25 | 22 | 17 | 20 | 270 |
| 8.51-11.50 | 4 | 6 | 9 | 7 | 1 | 0 | 1 | 2 | 5 | 6 | 40 | 14 | 6 | 8 | 6 | 12 | 127 |
| 11.51-14.50 | 1 | 0 | 3 | 4 | 1 | 1 | 0 | 1 | 0 | 0 | 3 | 4 | 0 | 0 | 0 | 1 | 19 |
| 14.51-20.50 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 4 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 134 | 71 | 52 | 32 | 13 | 11 | 7 | 9 | 23 | 67 | 190 | 148 | 134 | 135 | 156 | 167 | 1349 |



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ARIZONA PUBLIC SERVICE CO. - PALO VERDE NUCLEAR GENERATING STATION

JOINT FREQUENCY DISTRIBUTION FOR THE PERIOD 1/01/1998 TO 12/31/1998

*** ANNUAL ***

STABILITY CLASS G

STABILITY BASED ON: DELTA T BETWEEN 200.0 AND 35.0 FEET
 WIND MEASURED AT: 35.0 FEET
 WIND THRESHOLD AT: .75 MPH
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION IN HOURS AT 35.00 FEET

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|-----|-----|----|-----|---|-----|----|-----|---|-----|----|-----|----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 8 |
| 1.51- 2.50 | 29 | 16 | 2 | 4 | 0 | 0 | 2 | 3 | 1 | 3 | 6 | 5 | 8 | 25 | 28 | 51 | 183 |
| 2.51- 3.50 | 130 | 63 | 14 | 2 | 3 | 2 | 2 | 2 | 4 | 2 | 11 | 16 | 20 | 34 | 88 | 140 | 533 |
| 3.51- 4.50 | 193 | 68 | 17 | 6 | 2 | 4 | 1 | 1 | 1 | 2 | 10 | 13 | 16 | 32 | 68 | 137 | 571 |
| 4.51- 5.50 | 139 | 78 | 10 | 5 | 0 | 1 | 1 | 1 | 1 | 5 | 7 | 6 | 8 | 10 | 26 | 74 | 372 |
| 5.51- 6.50 | 72 | 53 | 9 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 7 | 1 | 4 | 6 | 7 | 40 | 207 |
| 6.51- 8.50 | 51 | 47 | 11 | 1 | 0 | 0 | 0 | 1 | 0 | 4 | 5 | 1 | 1 | 2 | 3 | 18 | 145 |
| 8.51-11.50 | 11 | 8 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 2 | 4 | 1 | 0 | 1 | 0 | 5 | 35 |
| 11.51-14.50 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 14.51-20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >20.50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 628 | 335 | 64 | 22 | 7 | 8 | 7 | 9 | 8 | 19 | 50 | 43 | 58 | 111 | 221 | 465 | 2055 |

STABILITY CLASS ALL

| SPEED (MPH) | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | TOTAL |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-------|
| CALM | | | | | | | | | | | | | | | | | 0 |
| .76- 1.50 | 3 | 5 | 2 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 | 1 | 2 | 0 | 20 |
| 1.51- 2.50 | 54 | 31 | 16 | 10 | 5 | 5 | 9 | 6 | 12 | 11 | 34 | 28 | 51 | 62 | 68 | 84 | 486 |
| 2.51- 3.50 | 200 | 102 | 47 | 22 | 18 | 15 | 16 | 22 | 33 | 46 | 77 | 85 | 93 | 127 | 167 | 221 | 1291 |
| 3.51- 4.50 | 254 | 126 | 52 | 29 | 10 | 8 | 17 | 18 | 52 | 49 | 97 | 74 | 68 | 84 | 143 | 220 | 1301 |
| 4.51- 5.50 | 191 | 126 | 44 | 35 | 13 | 17 | 20 | 32 | 85 | 98 | 89 | 77 | 59 | 42 | 66 | 113 | 1107 |
| 5.51- 6.50 | 105 | 79 | 41 | 38 | 28 | 14 | 19 | 35 | 100 | 103 | 148 | 74 | 60 | 32 | 26 | 67 | 969 |
| 6.51- 8.50 | 85 | 74 | 56 | 57 | 45 | 47 | 45 | 71 | 108 | 170 | 250 | 195 | 94 | 54 | 35 | 59 | 1445 |
| 8.51-11.50 | 34 | 24 | 34 | 61 | 62 | 61 | 31 | 26 | 74 | 123 | 313 | 156 | 64 | 47 | 34 | 32 | 1176 |
| 11.51-14.50 | 10 | 4 | 9 | 28 | 70 | 24 | 9 | 10 | 14 | 60 | 153 | 57 | 30 | 31 | 13 | 13 | 535 |
| 14.51-20.50 | 5 | 6 | 5 | 11 | 87 | 12 | 5 | 4 | 18 | 44 | 88 | 23 | 12 | 20 | 9 | 6 | 355 |
| >20.50 | 1 | 1 | 0 | 0 | 8 | 2 | 0 | 2 | 4 | 11 | 10 | 1 | 3 | 6 | 0 | 1 | 50 |
| TOTAL | 942 | 578 | 306 | 293 | 346 | 205 | 171 | 227 | 500 | 715 | 1260 | 771 | 536 | 506 | 563 | 816 | 8735 |

TOTAL NUMBER OF OBSERVATIONS: 8760

TOTAL NUMBER OF VALID OBSERVATIONS: 8735

TOTAL NUMBER OF MISSING OBSERVATIONS: 25

PERCENT DATA RECOVERY FOR THIS PERIOD: 99.7 %

MEAN WIND SPEED FOR THIS PERIOD: 6.7 MPH

TOTAL NUMBER OF OBSERVATIONS WITH BACKUP DATA: 0

PERCENTAGE OCCURRENCE OF STABILITY CLASSES

| A | B | C | D | E | F | G |
|-------|------|------|-------|-------|-------|-------|
| 10.17 | 7.41 | 7.38 | 18.03 | 18.04 | 15.44 | 23.53 |

DISTRIBUTION OF WIND DIRECTION VS STABILITY

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | CALM |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|------|
| A | 1 | 4 | 8 | 18 | 45 | 33 | 19 | 33 | 95 | 156 | 304 | 102 | 31 | 16 | 14 | 9 | 0 |
| B | 9 | 6 | 24 | 43 | 46 | 25 | 32 | 43 | 96 | 87 | 113 | 57 | 30 | 15 | 10 | 11 | 0 |
| C | 10 | 18 | 42 | 44 | 38 | 34 | 26 | 40 | 74 | 63 | 99 | 71 | 33 | 27 | 15 | 11 | 0 |
| D | 65 | 68 | 70 | 82 | 109 | 57 | 52 | 54 | 145 | 172 | 247 | 147 | 98 | 78 | 66 | 65 | 0 |
| E | 95 | 76 | 46 | 52 | 88 | 37 | 28 | 39 | 59 | 151 | 257 | 203 | 152 | 124 | 81 | 88 | 0 |
| F | 134 | 71 | 52 | 32 | 13 | 11 | 7 | 9 | 23 | 67 | 190 | 148 | 134 | 135 | 156 | 167 | 0 |
| G | 628 | 335 | 64 | 22 | 7 | 8 | 7 | 9 | 8 | 19 | 50 | 43 | 58 | 111 | 221 | 465 | 0 |
| TOTAL | 942 | 578 | 306 | 293 | 346 | 205 | 171 | 227 | 500 | 715 | 1260 | 771 | 536 | 506 | 563 | 816 | 0 |

APPENDIX C
DOSE CALCULATIONS



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GASEOUS EFFLUENT DOSE CALCULATIONS

Doses to the maximum individual and the surrounding population resulting from the release of radioactive material in gaseous effluents from the Palo Verde Nuclear Generating Station were calculated using the GASPARD computer program. The radionuclides considered in the dose calculations were Tritium, Iodine-131, Iodine-132, Iodine-133, Iodine-135, all noble gases, and particulates having a half-life greater than eight days and for which dose factors are contained in NUREG-0172. Locations selected for individual dose calculations included for each sector, the site boundary, and within five miles, if present, the nearest residence, the nearest garden, and the nearest milk animal. GASPARD implements the radiological dose models of Regulatory Guide 1.109 to determine the radiation exposure to man from four principal atmospheric exposure pathways: plume, ground deposition, inhalation, and ingestion. Doses to the maximum individual and the population were calculated as a function of age group and pathway for significant body organs.

Table 43 presents the doses on a quarterly, semiannual and annual basis for the Energy Information Center. An occupancy factor of 1.0 (implying continuous occupancy over the entire year) was considered for the Energy Information Center and the exposure pathways considered to calculate its doses were plume, ground deposition, and inhalation.

Table 44 presents the population dose.

Table 45 summarizes the individual doses and compares the result to PVNGS ODCM Requirement limits. The site boundary and residence locations for which data are presented represent the highest annual doses.

Based on results obtained by placing TLDs on the site boundary in each sector, the net dose for this reporting period, from direct-radiation, (plume and ground deposition) from all three units was indistinguishable from preoperational values of 8 - 14 $\mu\text{R/hr}$ (17 - 30 mR/Std Qtr).

There were no liquid effluents associated with the operation of this facility.



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Dose Calculation Models

The GASPAR computer code was used to evaluate the radiological consequences of the routine release of gaseous effluents. GASPAR implements the dose calculational methodologies of Regulatory Guide 1.109, Revision 1.

Source terms for each quarter are combined with station-specific demographic data and each quarter's atmospheric diffusion estimates for gaseous dose calculations.

Atmospheric diffusion estimates are generated by the XOQDOQ computer code using onsite meteorological data as input. Additional input to GASPAR includes the following site-specific data:

0 to 5 mile nearest residence, milk animal and garden in each of the 16 compass sectors, based on the 1998 Land Use Census.

0 to 10 mile population distribution based on the Maricopa County Department of Emergency Management, Emergency Response Manual, Annex B - PVNGS Emergency Procedures, Appendix 11, page 184, March 1, 1998.

The 10 to 50 mile population distribution from the PVNGS UFSAR, Figure 2.1-10.

The population distribution of metropolitan Phoenix greater than 50 miles from PVNGS, based on the 1980 federal census results, is conservatively included in the 40 to 50 mile sectors (NE=123; ENE=140,097; E=621,130; ESE=8,392).

Absolute humidity of 6.0 g/m^3 from the PVNGS UFSAR, Table 2.3-16.

The fraction of the year that vegetables are grown (0.667) from the PVNGS ER-OL, Section 2.1.3.4, Table 2.1-8.

The fraction of daily feed derived from pasture while on pasture (0.35) and length of grazing season for milk animals beyond 5 miles (0.75) from the PVNGS ER-OL, Section 2.1.3.4.3.

The fraction of daily feed derived from pasture while on pasture (0.05) and length of grazing season for meat animals (0.25) from the PVNGS ER-OL, Section 2.1.3.4.4.

There were no milk animals located within 5 miles.

Other values used for input to GASPAR are default values from Regulatory Guide 1.109, Revision 1.



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Table 43:
Doses To Special Locations For 1998

ENERGY INFORMATION CENTER LOCATED ONSITE 0.44 MILE S FROM UNIT 1, 0.29 MILE SSE FROM UNIT 2
AND 0.20 MILE ESE FROM UNIT 3

| (MREM) | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1ST QUARTER | | | | | | | | |
| ADULT | 5.33E-01 | 5.36E-01 | 2.55E-02 | 5.33E-01 | 5.33E-01 | 5.48E-01 | 5.69E-01 | 5.70E-01 |
| TEEN | 5.35E-01 | 5.39E-01 | 2.56E-02 | 5.35E-01 | 5.36E-01 | 5.55E-01 | 5.97E-01 | 5.72E-01 |
| CHILD | 4.76E-01 | 4.78E-01 | 2.58E-02 | 4.76E-01 | 4.77E-01 | 4.99E-01 | 5.32E-01 | 5.13E-01 |
| INFANT | 2.85E-01 | 2.85E-01 | 2.56E-02 | 2.85E-01 | 2.85E-01 | 3.05E-01 | 3.29E-01 | 3.21E-01 |
| 2ND QUARTER | | | | | | | | |
| ADULT | 2.12E-01 | 2.12E-01 | 7.11E-03 | 2.12E-01 | 2.12E-01 | 2.13E-01 | 2.12E-01 | 2.22E-01 |
| TEEN | 2.13E-01 | 2.13E-01 | 7.11E-03 | 2.13E-01 | 2.13E-01 | 2.14E-01 | 2.13E-01 | 2.24E-01 |
| CHILD | 1.90E-01 | 1.90E-01 | 7.11E-03 | 1.90E-01 | 1.90E-01 | 1.90E-01 | 1.90E-01 | 2.00E-01 |
| INFANT | 1.12E-01 | 1.12E-01 | 7.11E-03 | 1.12E-01 | 1.12E-01 | 1.12E-01 | 1.12E-01 | 1.22E-01 |
| 1ST SEMI-ANNUAL | | | | | | | | |
| ADULT | 7.45E-01 | 7.48E-01 | 3.26E-02 | 7.45E-01 | 7.45E-01 | 7.60E-01 | 7.81E-01 | 7.92E-01 |
| TEEN | 7.49E-01 | 7.53E-01 | 3.27E-02 | 7.49E-01 | 7.50E-01 | 7.69E-01 | 8.11E-01 | 7.96E-01 |
| CHILD | 6.66E-01 | 6.68E-01 | 3.29E-02 | 6.66E-01 | 6.67E-01 | 6.89E-01 | 7.22E-01 | 7.13E-01 |
| INFANT | 3.97E-01 | 3.97E-01 | 3.27E-02 | 3.97E-01 | 3.97E-01 | 4.17E-01 | 4.41E-01 | 4.44E-01 |
| 3RD QUARTER | | | | | | | | |
| ADULT | 2.48E-01 | 2.48E-01 | 3.21E-03 | 2.48E-01 | 2.48E-01 | 2.54E-01 | 2.48E-01 | 2.52E-01 |
| TEEN | 2.49E-01 | 2.49E-01 | 3.22E-03 | 2.49E-01 | 2.50E-01 | 2.57E-01 | 2.49E-01 | 2.54E-01 |
| CHILD | 2.21E-01 | 2.21E-01 | 3.22E-03 | 2.21E-01 | 2.21E-01 | 2.29E-01 | 2.21E-01 | 2.25E-01 |
| INFANT | 1.29E-01 | 1.29E-01 | 3.22E-03 | 1.29E-01 | 1.29E-01 | 1.36E-01 | 1.29E-01 | 1.33E-01 |
| 4TH QUARTER | | | | | | | | |
| ADULT | 6.26E-01 | 6.26E-01 | 4.44E-03 | 6.26E-01 | 6.26E-01 | 6.42E-01 | 6.26E-01 | 6.27E-01 |
| TEEN | 6.30E-01 | 6.30E-01 | 4.45E-03 | 6.30E-01 | 6.30E-01 | 6.51E-01 | 6.31E-01 | 6.31E-01 |
| CHILD | 5.58E-01 | 5.58E-01 | 4.47E-03 | 5.58E-01 | 5.58E-01 | 5.80E-01 | 5.58E-01 | 5.58E-01 |
| INFANT | 3.22E-01 | 3.22E-01 | 4.46E-03 | 3.22E-01 | 3.22E-01 | 3.43E-01 | 3.23E-01 | 2.76E-01 |
| 2ND SEMI-ANNUAL | | | | | | | | |
| ADULT | 8.74E-01 | 8.74E-01 | 7.65E-03 | 8.74E-01 | 8.74E-01 | 8.96E-01 | 8.74E-01 | 8.79E-01 |
| TEEN | 8.80E-01 | 8.80E-01 | 7.67E-03 | 8.80E-01 | 8.81E-01 | 9.09E-01 | 8.80E-01 | 8.85E-01 |
| CHILD | 7.79E-01 | 7.79E-01 | 7.70E-03 | 7.79E-01 | 7.79E-01 | 8.10E-01 | 7.79E-01 | 7.84E-01 |
| INFANT | 4.51E-01 | 4.51E-01 | 7.67E-03 | 4.51E-01 | 4.51E-01 | 4.79E-01 | 4.51E-01 | 4.09E-01 |
| ANNUAL | | | | | | | | |
| ADULT | 1.62E+00 | 1.62E+00 | 4.02E-02 | 1.62E+00 | 1.62E+00 | 1.66E+00 | 1.66E+00 | 1.67E+00 |
| TEEN | 1.63E+00 | 1.63E+00 | 4.04E-02 | 1.63E+00 | 1.63E+00 | 1.68E+00 | 1.69E+00 | 1.68E+00 |
| CHILD | 1.44E+00 | 1.45E+00 | 4.06E-02 | 1.44E+00 | 1.45E+00 | 1.50E+00 | 1.50E+00 | 1.50E+00 |
| INFANT | 8.47E-01 | 8.48E-01 | 4.04E-02 | 8.47E-01 | 8.48E-01 | 8.96E-01 | 8.92E-01 | 8.53E-01 |

Table 44:
Integrated Population Dose for 1998

JAN - MAR

| PATHWAY | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| PLUME | 1.72E-02
.33% | 1.72E-02
.32% | 1.72E-02
82.39% | 1.72E-02
.33% | 1.72E-02
.33% | 1.72E-02
.33% | 1.72E-02
.33% | 5.93E-02
1.13% |
| GROUND | 1.03E-03
.02% | 1.03E-03
.02% | 1.03E-03
4.91% | 1.03E-03
.02% | 1.03E-03
.02% | 1.03E-03
.02% | 1.03E-03
.02% | 1.22E-03
.02% |
| INHAL | 9.82E-01
18.85% | 9.85E-01
18.56% | 4.00E-04
1.91% | 9.82E-01
18.85% | 9.82E-01
18.84% | 1.00E+00
18.98% | 1.03E+00
19.56% | 9.82E-01
18.69% |
| VEGET | 3.66E+00
70.22% | 3.70E+00
69.67% | 1.12E-03
5.39% | 3.66E+00
70.22% | 3.66E+00
70.20% | 3.70E+00
70.10% | 3.66E+00
69.61% | 3.66E+00
69.66% |
| COW MILK | 3.70E-01
7.10% | 3.70E-01
6.97% | 1.74E-05
.08% | 3.70E-01
7.10% | 3.70E-01
7.10% | 3.77E-01
7.13% | 3.70E-01
7.04% | 3.70E-01
7.04% |
| MEAT | 1.82E-01
3.48% | 2.37E-01
4.46% | 1.11E-03
5.31% | 1.81E-01
3.48% | 1.83E-01
3.52% | 1.81E-01
3.44% | 1.81E-01
3.45% | 1.81E-01
3.45% |
| *TOTAL* | 5.21E+00 | 5.31E+00 | 2.09E-02 | 5.21E+00 | 5.21E+00 | 5.28E+00 | 5.26E+00 | 5.25E+00 |
| (1)
PER CAPITA
DOSE (REM) | 2.66E-06 | 2.71E-06 | 1.07E-08 | 2.66E-06 | 2.66E-06 | 2.70E-06 | 2.69E-06 | 2.68E-06 |

APR - JUN

| PATHWAY | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| PLUME | 8.88E-03
.22% | 8.88E-03
.22% | 8.88E-03
99.06% | 8.88E-03
.22% | 8.88E-03
.22% | 8.88E-03
.22% | 8.88E-03
.22% | 3.49E-02
.87% |
| GROUND | 5.74E-05
.00% | 5.74E-05
.00% | 5.74E-05
.64% | 5.74E-05
.00% | 5.74E-05
.00% | 5.74E-05
.00% | 5.74E-05
.00% | 6.73E-05
.00% |
| INHAL | 1.07E+00
26.81% | 1.07E+00
26.81% | 4.31E-06
.05% | 1.07E+00
26.81% | 1.07E+00
26.81% | 1.07E+00
26.82% | 1.07E+00
26.81% | 1.07E+00
26.64% |
| VEGET | 2.39E+00
60.01% | 2.39E+00
60.01% | 1.71E-05
.19% | 2.39E+00
60.01% | 2.39E+00
60.01% | 2.39E+00
60.00% | 2.39E+00
60.00% | 2.39E+00
59.61% |
| COW MILK | 4.11E-01
10.33% | 4.11E-01
10.33% | 5.02E-06
.06% | 4.11E-01
10.33% | 4.11E-01
10.33% | 4.11E-01
10.33% | 4.11E-01
10.33% | 4.11E-01
10.26% |
| MEAT | 1.05E-01
2.63% | 1.05E-01
2.63% | 1.47E-07
.00% | 1.05E-01
2.63% | 1.05E-01
2.63% | 1.05E-01
2.63% | 1.05E-01
2.63% | 1.05E-01
2.61% |
| *TOTAL* | 3.98E+00 | 3.98E+00 | 8.96E-03 | 3.98E+00 | 3.98E+00 | 3.98E+00 | 3.98E+00 | 4.00E+00 |
| (1)
PER CAPITA
DOSE (REM) | 2.03E-06 | 2.03E-06 | 4.57E-09 | 2.03E-06 | 2.03E-06 | 2.03E-06 | 2.03E-06 | 2.04E-06 |

Table 44: (continued)
Integrated Population Dose for 1998

JAN - JUN

| PATHWAY | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| PLUME | 2.61E-02
.28% | 2.61E-02
.28% | 2.61E-02
87.40% | 2.61E-02
.28% | 2.61E-02
.28% | 2.61E-02
.28% | 2.61E-02
.28% | 9.43E-02
1.02% |
| GROUND | 1.08E-03
.01% | 1.08E-03
.01% | 1.08E-03
3.63% | 1.08E-03
.01% | 1.08E-03
.01% | 1.08E-03
.01% | 1.08E-03
.01% | 1.29E-03
.01% |
| INHAL | 2.05E+00
22.29% | 2.05E+00
22.09% | 4.04E-04
1.35% | 2.05E+00
22.29% | 2.05E+00
22.29% | 2.07E+00
22.35% | 2.09E+00
22.68% | 2.05E+00
22.13% |
| VEGET | 6.05E+00
65.80% | 6.09E+00
65.53% | 1.14E-03
3.83% | 6.05E+00
65.80% | 6.05E+00
65.79% | 6.09E+00
65.76% | 6.05E+00
65.47% | 6.05E+00
65.31% |
| COW MILK | 7.81E-01
8.50% | 7.81E-01
8.41% | 2.25E-05
.08% | 7.81E-01
8.50% | 7.81E-01
8.49% | 7.88E-01
8.51% | 7.81E-01
8.46% | 7.81E-01
8.44% |
| MEAT | 2.86E-01
3.11% | 3.41E-01
3.68% | 1.11E-03
3.72% | 2.86E-01
3.11% | 2.88E-01
3.13% | 2.86E-01
3.09% | 2.86E-01
3.10% | 2.86E-01
3.09% |
| *TOTAL* | 9.19E+00 | 9.29E+00 | 2.98E-02 | 9.19E+00 | 9.19E+00 | 9.26E+00 | 9.23E+00 | 9.26E+00 |
| (1)
PER CAPITA
DOSE (REM) | 4.69E-06 | 4.74E-06 | 1.52E-08 | 4.69E-06 | 4.69E-06 | 4.73E-06 | 4.71E-06 | 4.73E-06 |

JUL - SEP

| PATHWAY | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| PLUME | 4.04E-03
.13% | 4.04E-03
.13% | 4.04E-03
93.32% | 4.04E-03
.13% | 4.04E-03
.13% | 4.04E-03
.13% | 4.04E-03
.13% | 1.50E-02
.48% |
| GROUND | 1.11E-04
.00% | 1.11E-04
.00% | 1.11E-04
2.56% | 1.11E-04
.00% | 1.11E-04
.00% | 1.11E-04
.00% | 1.11E-04
.00% | 1.31E-04
.00% |
| INHAL | 7.60E-01
24.20% | 7.60E-01
24.20% | 3.70E-05
.86% | 7.60E-01
24.20% | 7.60E-01
24.20% | 7.76E-01
24.20% | 7.60E-01
24.20% | 7.60E-01
24.12% |
| VEGET | 2.00E+00
63.61% | 2.00E+00
63.61% | 1.21E-04
2.80% | 2.00E+00
63.61% | 2.00E+00
63.61% | 2.04E+00
63.65% | 2.00E+00
63.61% | 2.00E+00
63.39% |
| COW MILK | 2.91E-01
9.26% | 2.91E-01
9.26% | 1.96E-05
.45% | 2.91E-01
9.26% | 2.91E-01
9.26% | 2.97E-01
9.28% | 2.91E-01
9.26% | 2.91E-01
9.23% |
| MEAT | 8.79E-02
2.80% | 8.79E-02
2.80% | 1.28E-07
.00% | 8.79E-02
2.80% | 8.79E-02
2.80% | 8.79E-02
2.74% | 8.79E-02
2.80% | 8.79E-02
2.79% |
| *TOTAL* | 3.14E+00 | 3.14E+00 | 4.33E-03 | 3.14E+00 | 3.14E+00 | 3.21E+00 | 3.14E+00 | 3.15E+00 |
| (1)
PER CAPITA
DOSE (REM) | 1.60E-06 | 1.60E-06 | 2.21E-09 | 1.60E-06 | 1.60E-06 | 1.64E-06 | 1.60E-06 | 1.61E-06 |

Table 44: (continued)
Integrated Population Dose for 1998

OCT - DEC

| PATHWAY | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| PLUME | 1.52E-04
.00% | 1.52E-04
.00% | 1.52E-04
25.31% | 1.52E-04
.00% | 1.52E-04
.00% | 1.52E-04
.00% | 1.52E-04
.00% | 2.13E-03
.03% |
| GROUND | 1.90E-04
.00% | 1.90E-04
.00% | 1.90E-04
31.71% | 1.90E-04
.00% | 1.90E-04
.00% | 1.90E-04
.00% | 1.90E-04
.00% | 2.24E-04
.00% |
| INHAL | 1.25E+00
18.87% | 1.25E+00
18.87% | 9.55E-05
15.93% | 1.25E+00
18.87% | 1.25E+00
18.87% | 1.29E+00
19.17% | 1.25E+00
18.88% | 1.25E+00
18.86% |
| VEGET | 4.67E+00
70.46% | 4.67E+00
70.46% | 1.45E-04
24.14% | 4.67E+00
70.46% | 4.67E+00
70.46% | 4.73E+00
70.22% | 4.67E+00
70.45% | 4.67E+00
70.44% |
| COW MILK | 4.71E-01
7.12% | 4.71E-01
7.12% | 1.74E-05
2.91% | 4.71E-01
7.12% | 4.71E-01
7.12% | 4.78E-01
7.11% | 4.71E-01
7.12% | 4.71E-01
7.11% |
| MEAT | 2.35E-01
3.55% | 2.35E-01
3.55% | 3.44E-08
.01% | 2.35E-01
3.55% | 2.35E-01
3.55% | 2.35E-01
3.50% | 2.35E-01
3.55% | 2.35E-01
3.55% |
| *TOTAL* | 6.63E+00 | 6.63E+00 | 6.00E-04 | 6.63E+00 | 6.63E+00 | 6.73E+00 | 6.63E+00 | 6.63E+00 |
| (1)
PER CAPITA
DOSE (REM) | 3.38E-06 | 3.38E-06 | 3.06E-10 | 3.38E-06 | 3.38E-06 | 3.44E-06 | 3.38E-06 | 3.38E-06 |

JUL - DEC

| PATHWAY | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| PLUME | 4.19E-03
.04% | 4.19E-03
.04% | 4.19E-03
85.05% | 4.19E-03
.04% | 4.19E-03
.04% | 4.19E-03
.04% | 4.19E-03
.04% | 1.71E-02
.18% |
| GROUND | 3.01E-04
.00% | 3.01E-04
.00% | 3.01E-04
6.11% | 3.01E-04
.00% | 3.01E-04
.00% | 3.01E-04
.00% | 3.01E-04
.00% | 3.54E-04
.00% |
| INHAL | 2.01E+00
20.58% | 2.01E+00
20.58% | 1.33E-04
2.69% | 2.01E+00
20.58% | 2.01E+00
20.58% | 2.07E+00
20.79% | 2.01E+00
20.59% | 2.01E+00
20.55% |
| VEGET | 6.67E+00
68.26% | 6.67E+00
68.26% | 2.66E-04
5.40% | 6.67E+00
68.26% | 6.67E+00
68.26% | 6.77E+00
68.10% | 6.67E+00
68.25% | 6.67E+00
68.17% |
| COW MILK | 7.62E-01
7.81% | 7.62E-01
7.80% | 3.70E-05
.75% | 7.62E-01
7.81% | 7.62E-01
7.81% | 7.76E-01
7.81% | 7.62E-01
7.80% | 7.62E-01
7.79% |
| MEAT | 3.23E-01
3.31% | 3.23E-01
3.31% | 1.62E-07
.00% | 3.23E-01
3.31% | 3.23E-01
3.31% | 3.23E-01
3.25% | 3.23E-01
3.31% | 3.23E-01
3.31% |
| *TOTAL* | 9.77E+00 | 9.77E+00 | 4.93E-03 | 9.77E+00 | 9.77E+00 | 9.93E+00 | 9.77E+00 | 9.78E+00 |
| (1)
PER CAPITA
DOSE (REM) | 4.99E-06 | 4.99E-06 | 2.52E-09 | 4.99E-06 | 4.99E-06 | 5.07E-06 | 4.99E-06 | 4.99E-06 |

Table 44: (continued)
Integrated Population Dose for 1998

JAN - DEC

| PATHWAY | T.BODY | GI-TRACT | BONE | LIVER | KIDNEY | THYROID | LUNG | SKIN |
|---------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| PLUME | 3.03E-02
.16% | 3.03E-02
.16% | 3.03E-02
87.06% | 3.03E-02
.16% | 3.03E-02
.16% | 3.03E-02
.16% | 3.03E-02
.16% | 1.11E-01
.59% |
| GROUND | 1.38E-03
.01% | 1.38E-03
.01% | 1.38E-03
3.98% | 1.38E-03
.01% | 1.38E-03
.01% | 1.38E-03
.01% | 1.38E-03
.01% | 1.65E-03
.01% |
| INHAL | 4.06E+00
21.41% | 4.06E+00
21.32% | 5.37E-04
1.54% | 4.06E+00
21.41% | 4.06E+00
21.41% | 4.14E+00
21.55% | 4.11E+00
21.61% | 4.06E+00
21.32% |
| VEGET | 1.27E+01
67.06% | 1.28E+01
66.93% | 1.41E-03
4.05% | 1.27E+01
67.06% | 1.27E+01
67.06% | 1.29E+01
66.97% | 1.27E+01
66.90% | 1.27E+01
66.78% |
| COW MILK | 1.54E+00
8.14% | 1.54E+00
8.10% | 5.94E-05
.17% | 1.54E+00
8.14% | 1.54E+00
8.14% | 1.56E+00
8.15% | 1.54E+00
8.12% | 1.54E+00
8.11% |
| MEAT | 6.09E-01
3.21% | 6.65E-01
3.49% | 1.11E-03
3.19% | 6.09E-01
3.21% | 6.11E-01
3.22% | 6.09E-01
3.17% | 6.09E-01
3.21% | 6.09E-01
3.20% |
| *TOTAL* | 1.90E+01 | 1.91E+01 | 3.48E-02 | 1.90E+01 | 1.90E+01 | 1.92E+01 | 1.90E+01 | 1.90E+01 |
| (1)
PER CAPITA
DOSE (REM) | 9.70E-06 | 9.75E-06 | 1.78E-08 | 9.70E-06 | 9.70E-06 | 9.80E-06 | 9.70E-06 | 9.70E-06 |

Note 1: Personrem total divided by 50-mile population of 1,959,000

**Table 45:
Summary of Individual Doses for 1998**

| | Unit | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 | Year total |
|---|--------------------|-----------|-----------|-----------|-----------|------------|
| Gamma Air Dose | mrad | 1.22E-02 | 3.45E-03 | 1.65E-03 | 1.24E-03 | 1.69E-02 |
| ODCM Req. 4.1 Limit | mrad | 5.00E+00 | 5.00E+00 | 5.00E+00 | 5.00E+00 | 1.00E+01 |
| % ODCM Limit | % | 2.44E-01 | 6.90E-02 | 3.30E-02 | 2.48E-02 | 1.69E-01 |
| Beta Air Dose | mrad | 2.35E-02 | 6.20E-03 | 4.00E-03 | 9.81E-04 | 3.14E-02 |
| ODCM Req. 4.1 Limit | mrad | 1.00E+01 | 1.00E+01 | 1.00E+01 | 1.00E+01 | 2.00E+01 |
| % ODCM Limit | % | 2.35E-01 | 6.20E-02 | 4.00E-02 | 9.81E-03 | 1.57E-01 |
| Maximum Individual | | | | | | |
| Total Body | mrem | 7.72E-03 | 2.15E-03 | 9.97E-04 | 8.25E-04 | 1.06E-02 |
| Skin | mrem | 2.07E-02 | 5.34E-03 | 2.62E-03 | 1.65E-03 | 2.75E-02 |
| Site Boundary Location | | | | | | |
| Unit 1 | miles | 1.27 SE | 1.87 S | 1.87 S | 1.87 S | 1.70 SSE |
| Unit 2 | miles | 1.31 SE | 1.68 S | 1.68 S | 1.68 S | 1.88 SSE |
| Unit 3 | miles | 1.40 SE | 1.46 S | 1.46 S | 1.46 S | 1.73 SSE |
| Maximum Organ Dose
(excluding skin) | Age | Child | Child | Child | Child | Child |
| | Organ | Lung | Thyroid | Thyroid | Thyroid | Thyroid |
| | mrem | 1.21E-01 | 7.16E-02 | 6.00E-02 | 1.45E-01 | 3.73E-01 |
| ODCM Req. 4.2 Limit | mrem | 7.50E+00 | 7.50E+00 | 7.50E+00 | 7.50E+00 | 1.50E+01 |
| % ODCM Limit (1) | % | 1.61E+00 | 9.55E-01 | 8.00E-01 | 1.93E+00 | 2.49E+00 |
| Location | | | | | | |
| Unit 1 | miles | 3.74 ESE | 2.68 ENE | 2.68 ENE | 3.74 ESE | 3.74 ESE |
| Unit 2 | miles | 3.78 ESE | 2.87 ENE | 2.87 ENE | 3.78 ESE | 3.78 ESE |
| Unit 3 | miles | 3.76 ESE | 3.02 ENE | 3.02 ENE | 3.76 ESE | 3.76 ESE |
| Organ dose from tritium
only for Unit 2 location
above | mrem | 1.18E-01 | 7.11E-02 | 5.86E-02 | 1.43E-01 | 3.67E-01 |
| Fraction of organ dose
from tritium only for Unit 2
location above | % | 97.5 | 99.3 | 97.7 | 98.6 | 98.4 |
| X/Q for Unit 2 location
above | sec/m ³ | 1.03E-06 | 7.05E-07 | 4.74E-07 | 1.39E-06 | 8.39E-07 |
| D/Q for Unit 2 location
above | m ⁻² | 6.36E-10 | 1.47E-09 | 1.19E-09 | 4.71E-10 | 4.21E-10 |
| Note 1: ODCM Requirement 5.1 has higher limits than ODCM Requirement 4.2, therefore the percent of limits are more conservative based on ODCM Requirement 4.2 than on ODCM Requirement 5.1. | | | | | | |

APPENDIX D
RCS RADIOIODINE



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| Unit | Date | Power | Mode | Letdown | I-131 | I-132 | I-133 | I-134 | I-135 | IDEQ | Time OOS |
|-----------------------|----------------|-------|------|---------|----------|----------|----------|----------|----------|----------|----------|
| | | % | | gpm | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | Hours |
| Unit 1 September 1991 | | | | | | | | | | | 11.1 |
| 1 | 9/12/91 00:40 | 100 | 1 | 64 | 4.12E-02 | 3.48E-01 | 2.28E-01 | 5.38E-01 | 3.52E-01 | 1.54E-01 | |
| 1 | 9/13/91 00:30 | 100 | 1 | 63 | 4.81E-02 | 3.54E-01 | 2.33E-01 | 5.14E-01 | 3.63E-01 | 1.63E-01 | |
| 1 | 9/14/91 01:00 | 100 | 1 | 63 | 5.45E-02 | 3.88E-01 | 2.56E-01 | 3.68E-01 | 3.55E-01 | 1.44E-01 | |
| 1 | 9/14/91 13:59 | 100 | 1 | 63 | 5.24E-02 | 3.40E-01 | 2.55E-01 | 3.90E-01 | 3.61E-01 | 1.40E-01 | |
| 1 | 9/14/91 20:45 | 0 | 3 | 64 | 1.79E+00 | 1.13E+00 | 1.61E+00 | 2.21E-01 | 9.26E-01 | 2.35E+00 | |
| 1 | 9/15/91 00:04 | 0 | 3 | 115 | 1.55E+00 | 6.92E-01 | 1.26E+00 | < LLD | 5.30E-01 | 1.96E+00 | |
| 1 | 9/15/91 04:00 | 0 | 3 | 115 | 1.14E+00 | 4.62E-01 | 8.19E-01 | < LLD | 2.58E-01 | 1.40E+00 | |
| 1 | 9/15/91 07:49 | 0 | 3 | 118 | 7.87E-01 | 3.22E-01 | 5.06E-01 | < LLD | 1.25E-01 | 9.46E-01 | |
| 1 | 9/15/91 11:26 | 0 | 3 | 116 | 5.77E-01 | 2.96E-01 | 3.39E-01 | < LLD | 6.43E-02 | 6.85E-01 | |
| Unit 1 October 1991 | | | | | | | | | | | 6.8 |
| 1 | 10/24/91 00:24 | 100 | 1 | 67 | 7.83E-02 | 4.00E-01 | 3.11E-01 | 5.95E-01 | 4.36E-01 | 2.24E-01 | |
| 1 | 10/26/91 01:03 | 100 | 1 | 64 | 6.36E-02 | 3.35E-01 | 2.52E-01 | 4.92E-01 | 3.62E-01 | 1.83E-01 | |
| 1 | 10/27/91 01:25 | 100 | 1 | 65 | 6.79E-02 | 3.62E-01 | 2.72E-01 | 5.49E-01 | 3.81E-01 | 1.96E-01 | |
| 1 | 10/27/91 10:56 | 0 | 3 | 60 | 9.83E-01 | 7.50E-01 | 1.17E+00 | 1.23E-01 | 7.51E-01 | 1.39E+00 | |
| 1 | 10/27/91 14:24 | 0 | 3 | 60 | 8.66E-01 | 5.40E-01 | 9.13E-01 | < LLD | 4.55E-01 | 1.17E+00 | |
| 1 | 10/27/91 17:46 | 0 | 3 | 104 | 6.62E-01 | 4.30E-01 | 6.30E-01 | < LLD | 2.42E-01 | 8.68E-01 | |
| 1 | 10/27/91 21:44 | 0 | 3 | 105 | 4.79E-01 | 3.78E-01 | 4.08E-01 | < LLD | 1.24E-01 | 6.14E-01 | |

| Unit | Date | Power | Mode | Letdown | I-131 | I-132 | I-133 | I-134 | I-135 | IDEQ | Time OOS |
|----------------------|---------------|-------|------|---------|----------|----------|----------|----------|----------|----------|----------|
| | | % | | gpm | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | Hours |
| Unit 1 January 1992 | | | | | | | | | | | 47.4 |
| 1 | 1/1/92 00:01 | 100 | 1 | 63 | 9.07E-02 | 5.17E-01 | 3.84E-01 | 7.27E-01 | 5.26E-01 | 2.70E-01 | |
| 1 | 1/2/92 00:52 | 100 | 1 | 63 | 9.59E-02 | 5.10E-01 | 3.83E-01 | 7.37E-01 | 5.36E-01 | 2.76E-01 | |
| 1 | 1/2/92 20:47 | 100 | 1 | 63 | 1.10E-01 | 5.06E-01 | 3.73E-01 | 5.67E-01 | 4.58E-01 | 2.77E-01 | |
| 1 | 1/3/92 00:24 | 0 | 3 | 30 | 3.32E+00 | 2.00E+00 | 2.97E+00 | 2.25E-01 | 1.61E+00 | 4.33E+00 | |
| 1 | 1/3/92 03:41 | 0 | 3 | 30 | 2.69E+00 | 1.09E+00 | 2.21E+00 | < LLD | 9.41E-01 | 3.41E+00 | |
| 1 | 1/3/92 07:29 | 0 | 3 | 30 | 2.21E+00 | 6.97E-01 | 1.62E+00 | < LLD | 4.95E-01 | 2.72E+00 | |
| 1 | 1/3/92 11:15 | 0 | 3 | 30 | 1.77E+00 | 4.28E-01 | 1.16E+00 | < LLD | 3.15E-01 | 2.13E+00 | |
| 1 | 1/3/92 15:05 | 0 | 4 | 30 | 1.51E+00 | 3.83E-01 | 8.86E-01 | < LLD | 1.64E-01 | 1.78E+00 | |
| 1 | 1/3/92 17:30 | 0 | 4 | 30 | 1.39E+00 | 3.73E-01 | 7.56E-01 | < LLD | 1.09E-01 | 1.62E+00 | |
| 1 | 1/3/92 20:48 | 0 | 4 | 30 | 1.21E+00 | 2.56E-01 | 6.03E-01 | < LLD | 8.34E-02 | 1.39E+00 | |
| 1 | 1/4/92 00:40 | 0 | 5 | 20 | 9.61E-01 | 2.16E-01 | 4.23E-01 | < LLD | 3.73E-02 | 1.09E+00 | |
| 1 | 1/4/92 04:17 | 0 | 5 | 20 | 1.15E+00 | 2.11E-01 | 4.58E-01 | < LLD | 3.46E-02 | 1.28E+00 | |
| 1 | 1/4/92 08:00 | 0 | 5 | 20 | 1.12E+00 | 1.81E-01 | 4.01E-01 | < LLD | 2.25E-02 | 1.24E+00 | |
| 1 | 1/4/92 23:50 | 0 | 5 | 20 | 6.35E-01 | 1.46E-01 | 1.43E-01 | < LLD | < LLD | 6.79E-01 | |
| 1 | 1/4/92 11:50 | 0 | 5 | 20 | 1.03E+00 | 1.07E-01 | 3.27E-01 | < LLD | 1.32E-02 | 1.12E+00 | |
| 1 | 1/4/92 15:50 | 0 | 5 | 20 | 8.33E-01 | 1.71E-01 | 2.39E-01 | < LLD | 6.84E-03 | 9.05E-01 | |
| 1 | 1/4/92 19:50 | 0 | 5 | 20 | 7.23E-01 | 1.55E-01 | 1.79E-01 | < LLD | 5.28E-03 | 7.78E-01 | |
| Unit 1 February 1992 | | | | | | | | | | | 15.8 |
| 1 | 2/12/92 23:30 | 100 | 1 | 65 | 1.04E-01 | 6.19E-01 | 4.76E-01 | 7.84E-01 | 6.53E-01 | 3.24E-01 | |
| 1 | 2/14/92 02:00 | 92 | 1 | 64 | 1.02E-02 | 6.07E-01 | 4.69E-01 | 8.04E-01 | 6.46E-01 | 2.27E-01 | |
| 1 | 2/15/92 03:35 | 0 | 3 | 106 | 2.18E+00 | 1.72E+00 | 2.08E+00 | 3.12E-01 | 1.26E+00 | 2.91E+00 | |
| 1 | 2/15/92 07:30 | 0 | 3 | 100 | 1.78E+00 | 9.97E-01 | 1.51E+00 | < LLD | 7.03E-01 | 2.28E+00 | |
| 1 | 2/15/92 11:30 | 0 | 3 | 100 | 1.27E+00 | 5.47E-01 | 9.68E-01 | < LLD | 3.29E-01 | 1.58E+00 | |
| 1 | 2/15/92 15:30 | 0 | 3 | 100 | 9.74E-01 | 3.72E-01 | 6.63E-01 | < LLD | 1.70E-01 | 1.18E+00 | |
| 1 | 2/15/92 19:20 | 0 | 3 | 100 | 7.26E-01 | 2.96E-01 | 4.39E-01 | < LLD | 9.20E-02 | 8.63E-01 | |
| 1 | 2/15/92 23:08 | 0 | 3 | 100 | 5.68E-01 | 2.60E-01 | 3.08E-01 | < LLD | 4.61E-02 | 6.65E-01 | |
| 1 | 2/17/92 00:00 | 0 | 4 | 67 | 2.09E-01 | 1.96E-01 | 5.70E-02 | < LLD | < LLD | 2.31E-01 | |



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| Unit | Date | Power | Mode | Letdown | I-131 | I-132 | I-133 | I-134 | I-135 | IDEQ | Time OOS |
|-----------------------|----------------|-------|------|---------|----------|----------|----------|----------|----------|----------|----------|
| | | % | | gpm | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | Hours |
| Unit 1 September 1992 | | | | | | | | | | | 7.8 |
| 1 | 9/26/92 05:28 | 100 | 1 | 64 | 1.98E-02 | 1.73E-01 | 1.37E-01 | 2.50E-01 | 1.81E-01 | 8.26E-02 | |
| 1 | 9/27/92 00:20 | 100 | 1 | 105 | 1.36E-02 | 1.64E-01 | 9.43E-02 | 2.76E-01 | 1.66E-01 | 6.37E-02 | |
| 1 | 9/28/92 00:35 | 100 | 1 | 70 | 1.55E-02 | 2.04E-01 | 1.03E-01 | 3.25E-01 | 1.81E-01 | 7.15E-02 | |
| 1 | 9/29/92 00:13 | 0 | 3 | 63 | 8.64E-01 | 5.03E-01 | 8.97E-01 | 1.57E-01 | 5.30E-01 | 1.17E+00 | |
| 1 | 9/29/92 04:00 | 0 | 3 | 108 | 9.23E-01 | 3.53E-01 | 8.87E-01 | < LLD | 3.79E-01 | 1.21E+00 | |
| 1 | 9/29/92 08:00 | 0 | 3 | 115 | 6.49E-01 | 2.66E-01 | 5.62E-01 | < LLD | 1.94E-01 | 8.27E-01 | |
| 1 | 9/30/92 00:10 | 0 | 3 | 103 | 1.59E-01 | 1.80E-01 | 8.53E-02 | < LLD | 1.12E-02 | 1.90E-01 | |
| Unit 2 December 1986 | | | | | | | | | | | 6.0 |
| 2 | 12/21/86 01:27 | 100 | 1 | 75 | 9.63E-02 | 6.31E-02 | 1.12E-01 | 6.11E-02 | 8.62E-02 | 1.37E-01 | |
| 2 | 12/23/86 01:18 | 100 | 1 | 75 | 9.85E-02 | 6.74E-02 | 1.20E-01 | 6.50E-02 | 8.76E-02 | 1.42E-01 | |
| 2 | 12/24/86 02:27 | 100 | 1 | 75 | 9.65E-02 | 6.48E-02 | 1.15E-01 | 6.18E-02 | 8.59E-02 | 1.38E-01 | |
| 2 | 12/25/86 10:30 | 0 | 3 | 75 | 1.03E+00 | 1.24E-01 | 7.29E-01 | < LLD | 1.81E-01 | 1.24E+00 | |
| 2 | 12/25/86 13:33 | 0 | 3 | 75 | 9.10E-01 | 1.12E-01 | 5.88E-01 | < LLD | 1.09E-01 | 1.08E+00 | |
| 2 | 12/25/86 16:30 | 0 | 3 | 75 | 8.28E-01 | 1.18E-01 | 4.91E-01 | < LLD | 7.55E-02 | 9.72E-01 | |
| 2 | 12/25/86 19:45 | 0 | 3 | 75 | 7.19E-01 | 1.15E-01 | 3.87E-01 | < LLD | 4.86E-02 | 8.32E-01 | |
| Unit 2 July 1997 | | | | | | | | | | | 35.8 |
| 2 | 7/20/87 04:10 | 100 | 1 | 75 | 1.52E-01 | 1.44E-01 | 2.19E-01 | 1.39E-01 | 1.64E-01 | 2.33E-01 | |
| 2 | 7/21/87 02:05 | 100 | 1 | 75 | 1.43E-01 | 1.44E-01 | 2.26E-01 | 1.41E-01 | 1.63E-01 | 2.26E-01 | |
| 2 | 7/22/87 02:26 | 100 | 1 | 75 | 1.45E-01 | 1.43E-01 | 2.15E-01 | 1.36E-01 | 1.61E-01 | 2.24E-01 | |
| 2 | 7/23/87 00:01 | 0 | 3 | 74 | 7.43E-01 | 3.56E-01 | 9.50E-01 | 1.42E-02 | 4.72E-01 | 1.05E+00 | |
| 2 | 7/23/87 03:00 | 0 | 3 | 75 | 9.11E-01 | 2.70E-01 | 9.48E-01 | < LLD | 3.85E-01 | 1.21E+00 | |
| 2 | 7/23/87 06:19 | 0 | 3 | 75 | 6.63E-01 | 1.45E-01 | 5.95E-01 | < LLD | 1.82E-01 | 8.44E-01 | |
| 2 | 7/24/87 01:55 | 9 | 1 | 74 | 8.92E-01 | 2.25E-01 | 3.65E-01 | 6.82E-03 | 2.99E-02 | 1.00E+00 | |
| 2 | 7/24/87 04:20 | 9 | 1 | 75 | 1.14E+00 | 2.38E-01 | 4.15E-01 | 2.25E-02 | 3.97E-02 | 1.26E+00 | |
| 2 | 7/24/87 08:02 | 9 | 1 | 75 | 9.91E-01 | 1.41E-01 | 3.35E-01 | 2.73E-02 | 3.43E-02 | 1.09E+00 | |
| 2 | 7/24/87 11:50 | 9 | 1 | 75 | 8.69E-01 | 1.64E-01 | 2.81E-01 | 5.41E-02 | 4.77E-02 | 9.56E-01 | |
| 2 | 7/25/87 02:28 | 95 | 1 | 75 | 5.31E-01 | 1.58E-01 | 2.08E-01 | 1.51E-01 | 1.62E-01 | 6.09E-01 | |



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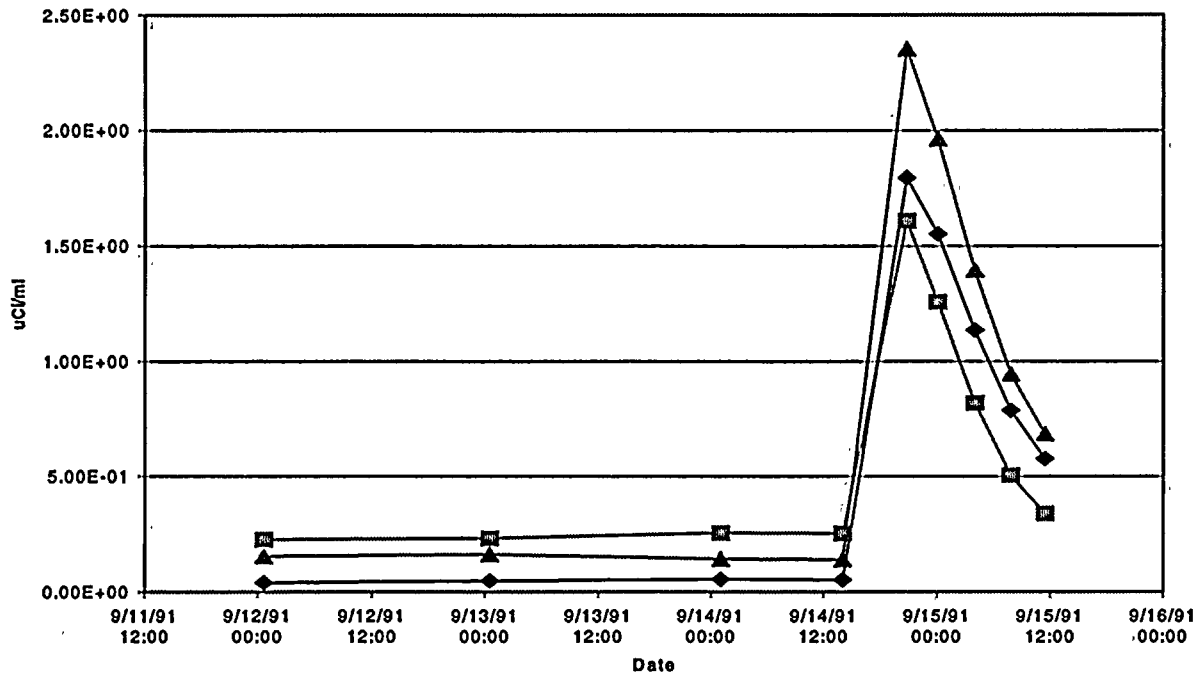


1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

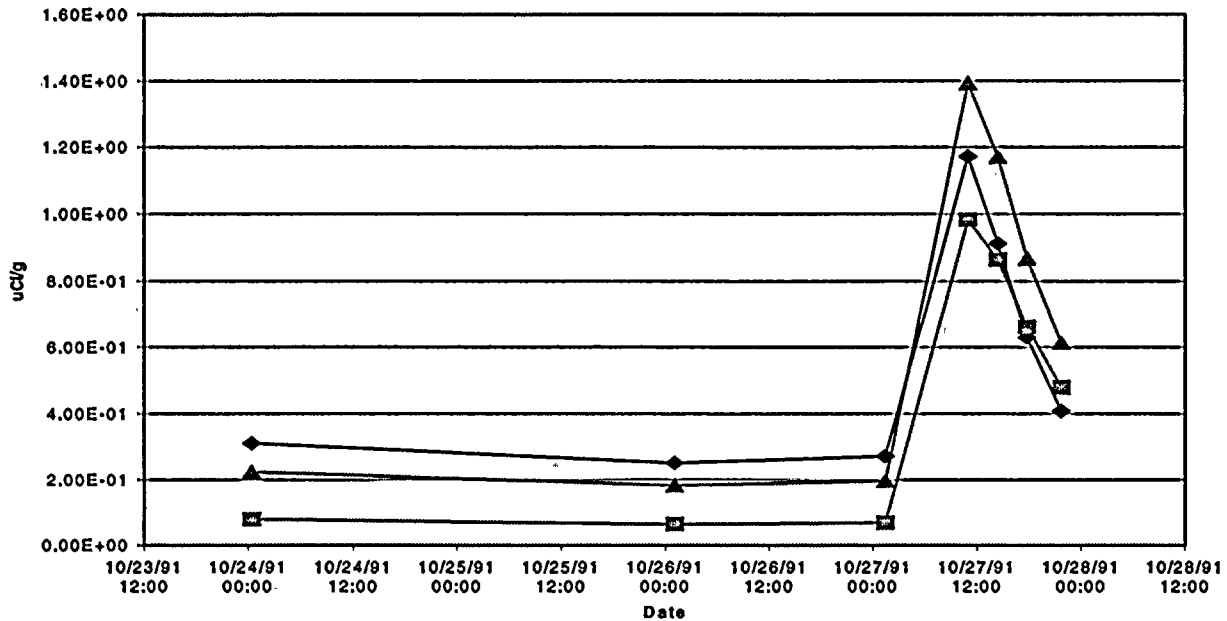


| Unit | Date | Power | Mode | Letdown | I-131 | I-132 | I-133 | I-134 | I-135 | IDEQ | Time OOS |
|----------------------|---------------|-------|------|---------|----------|----------|----------|----------|----------|----------|----------|
| | | % | | gpm | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | uCi/g | Hours |
| Unit 2 February 1988 | | | | | | | | | | | 47.9 |
| 2 | 2/18/88 01:45 | 100 | 1 | 75 | 9.27E-02 | 2.65E-01 | 1.97E-01 | 3.36E-01 | 2.59E-01 | 1.83E-01 | |
| 2 | 2/19/88 02:00 | 96 | 1 | 78 | 9.23E-02 | 2.49E-01 | 1.79E-01 | 3.13E-01 | 2.45E-01 | 1.76E-01 | |
| 2 | 2/20/88 00:02 | 55 | 1 | 65 | 1.34E-01 | 2.82E-01 | 2.41E-01 | 2.70E-01 | 2.63E-01 | 2.36E-01 | |
| 2 | 2/20/88 04:05 | 0 | 3 | 65 | 1.91E+00 | 1.19E+00 | 1.84E+00 | 1.68E-01 | 1.05E+00 | 2.54E+00 | |
| 2 | 2/20/88 04:53 | 0 | 3 | 65 | 2.10E+00 | 1.12E+00 | 1.95E+00 | 1.10E-01 | 1.07E+00 | 2.76E+00 | |
| 2 | 2/20/88 07:17 | 0 | 3 | 65 | 2.07E+00 | 7.33E-01 | 1.76E+00 | 1.46E-02 | 7.71E-01 | 2.64E+00 | |
| 2 | 2/20/88 11:16 | 0 | 3 | 65 | 1.69E+00 | 3.40E-01 | 1.25E+00 | < LLD | 4.31E-01 | 2.08E+00 | |
| 2 | 2/20/88 14:44 | 0 | 3 | 65 | 1.28E+00 | 1.75E-01 | 8.64E-01 | < LLD | 2.24E-01 | 1.54E+00 | |
| 2 | 2/20/88 17:45 | 0 | 3 | 65 | 1.39E+00 | 1.85E-01 | 8.49E-01 | < LLD | 1.81E-01 | 1.64E+00 | |
| 2 | 2/20/88 22:03 | 0 | 4 | 65 | 1.33E+00 | 1.67E-01 | 7.12E-01 | < LLD | 1.08E-01 | 1.54E+00 | |
| 2 | 2/21/88 00:05 | 0 | 4 | 40 | 1.26E+00 | 1.43E-01 | 6.43E-01 | < LLD | 8.46E-02 | 1.45E+00 | |
| 2 | 2/21/88 02:03 | 0 | 4 | 40 | 1.25E+00 | 1.24E-01 | 5.48E-01 | < LLD | 7.81E-02 | 1.40E+00 | |
| 2 | 2/22/88 00:08 | 0 | 5 | 75 | 1.08E+00 | 1.08E-01 | 2.72E-01 | < LLD | < LLD | 1.16E+00 | |
| 2 | 2/22/88 04:00 | 0 | 5 | 120 | 8.77E-01 | 8.48E-02 | 1.99E-01 | < LLD | < LLD | 9.34E-01 | |
| 2 | 2/23/88 00:47 | 0 | 5 | 120 | 3.05E-01 | 5.08E-02 | 3.52E-02 | < LLD | < LLD | 3.17E-01 | |
| 2 | 2/24/88 19:53 | 0 | 5 | 140 | 1.03E-02 | 8.38E-03 | | < LLD | < LLD | 1.06E-02 | |
| Unit 3 August 1990 | | | | | | | | | | | 3.9 |
| 3 | 8/3/90 01:25 | 100 | 1 | 65 | 1.88E-02 | 1.85E-02 | 2.41E-02 | 2.40E-02 | 2.62E-02 | 2.86E-02 | |
| 3 | 8/4/90 04:35 | 100 | 1 | 65 | 1.75E-02 | 1.93E-02 | 2.35E-02 | 2.47E-02 | 2.28E-02 | 2.69E-02 | |
| 3 | 8/5/90 02:15 | 100 | 1 | 64 | 1.77E-02 | 1.76E-02 | 2.13E-02 | 2.36E-02 | 2.48E-02 | 2.66E-02 | |
| 3 | 8/6/90 00:35 | 0 | 3 | 63 | 9.62E-01 | 1.93E-01 | 9.10E-01 | < LLD | 3.46E-01 | 1.25E+00 | |
| 3 | 8/6/90 04:30 | 0 | 3 | 64 | 7.81E-01 | 1.16E-01 | 6.59E-01 | < LLD | 1.87E-01 | 9.79E-01 | |
| 3 | 8/7/90 01:10 | 0 | 3 | 64 | 2.32E-01 | 6.06E-02 | 1.06E-01 | < LLD | 6.92E-03 | 2.64E-01 | |

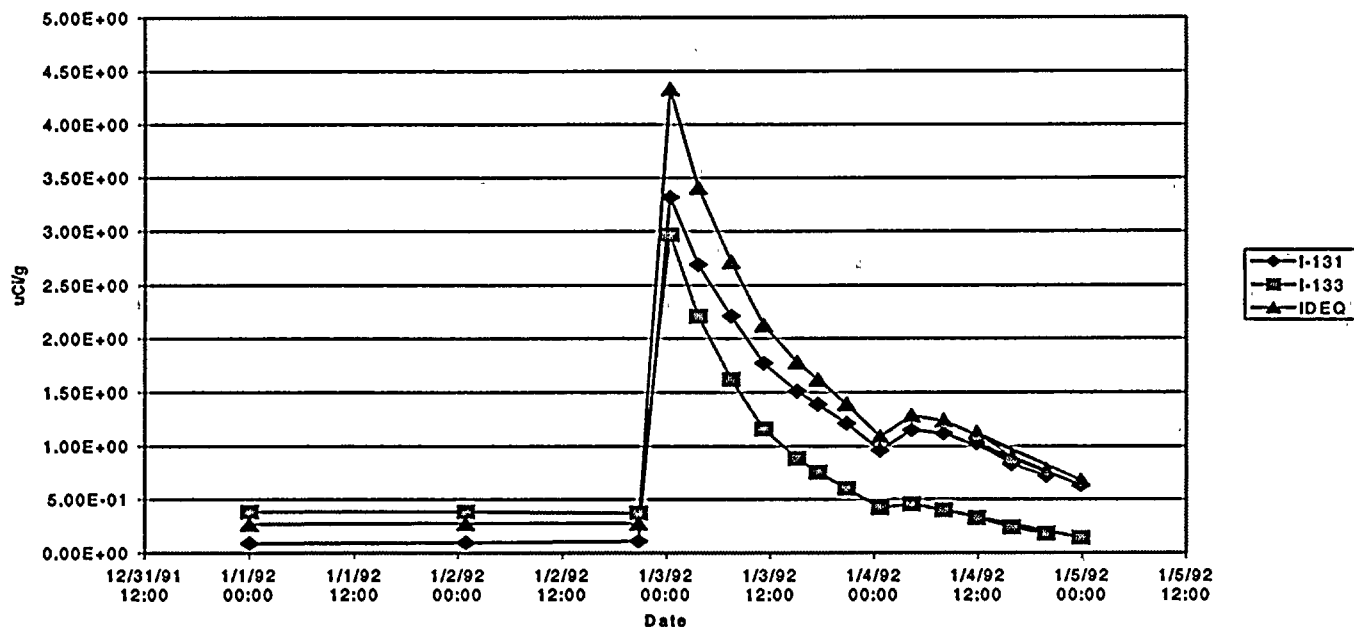
Unit One Dose Equivalent Iodine - September 1991



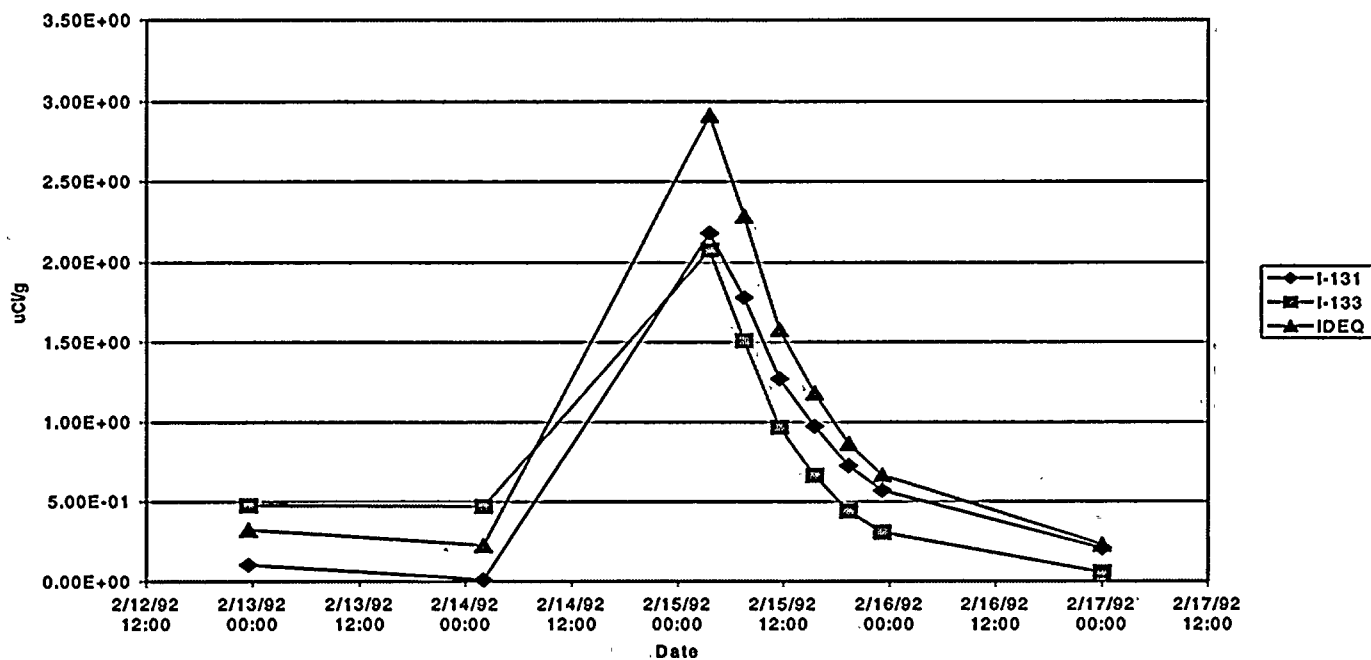
Unit One Dose Equivalent Iodine - October 1991



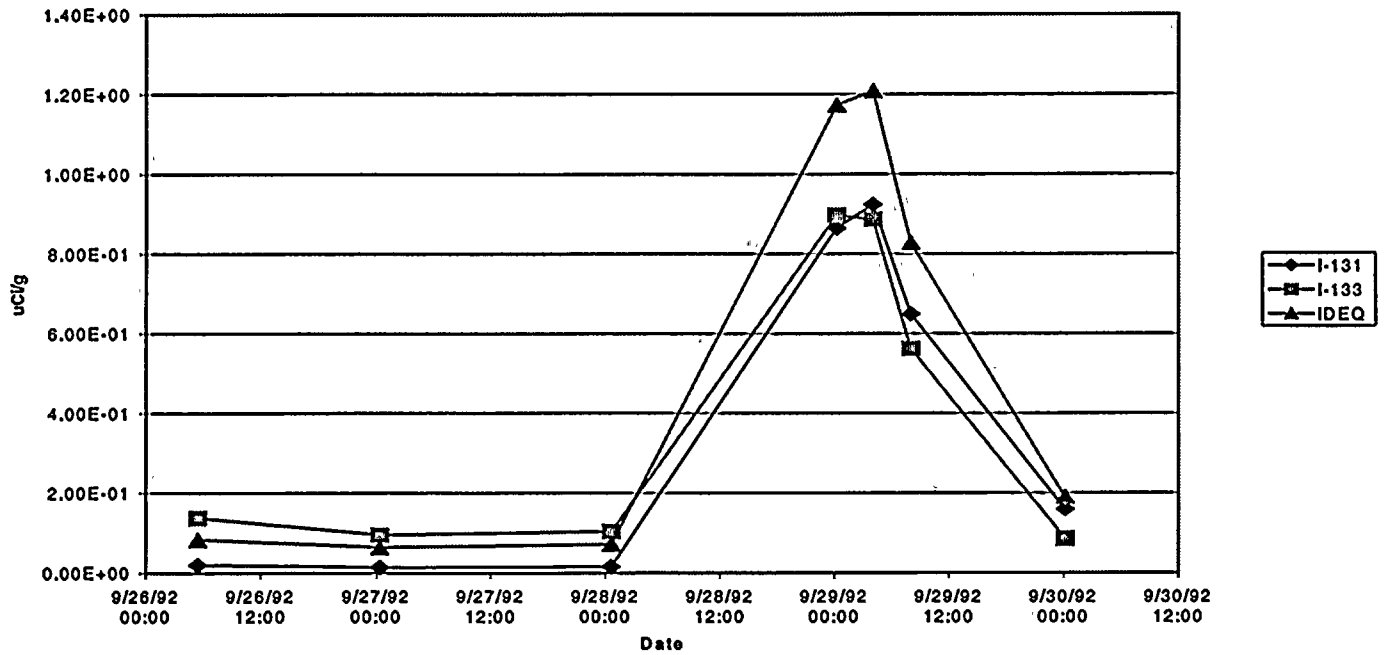
Unit One Dose Equivalent, Iodine - January 1992



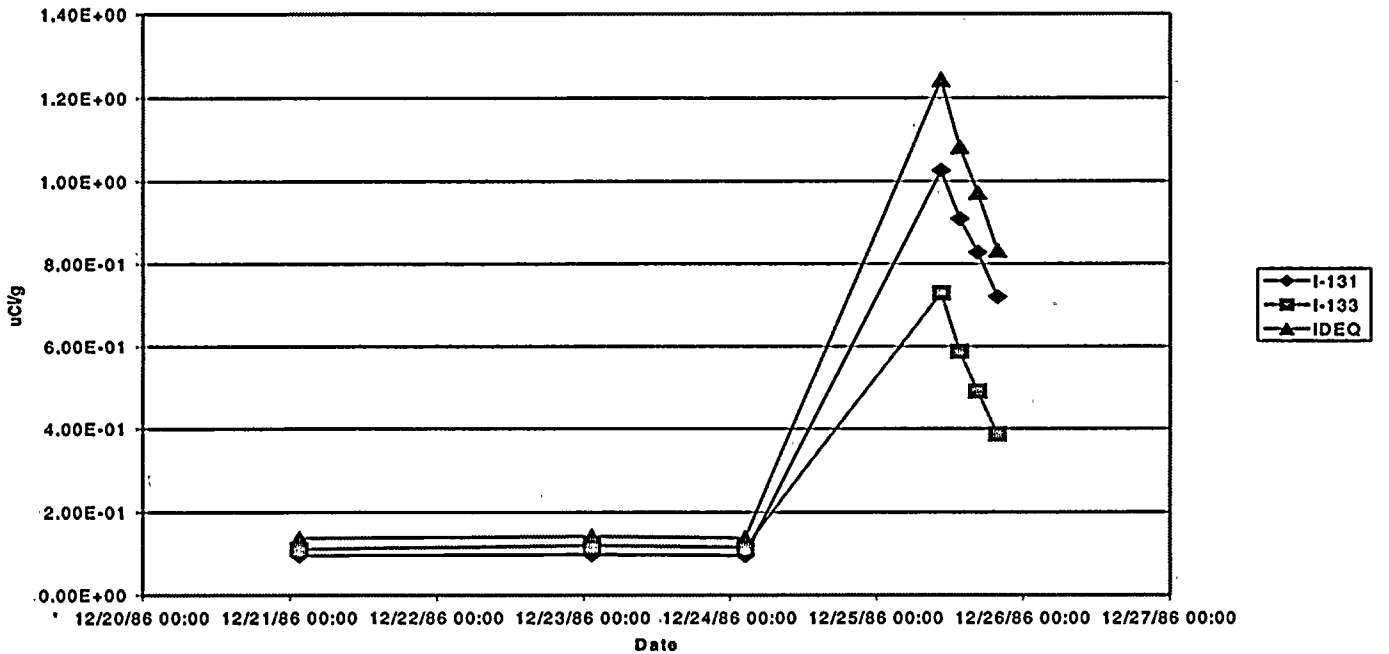
Unit One Dose Equivalent Iodine - February 1992



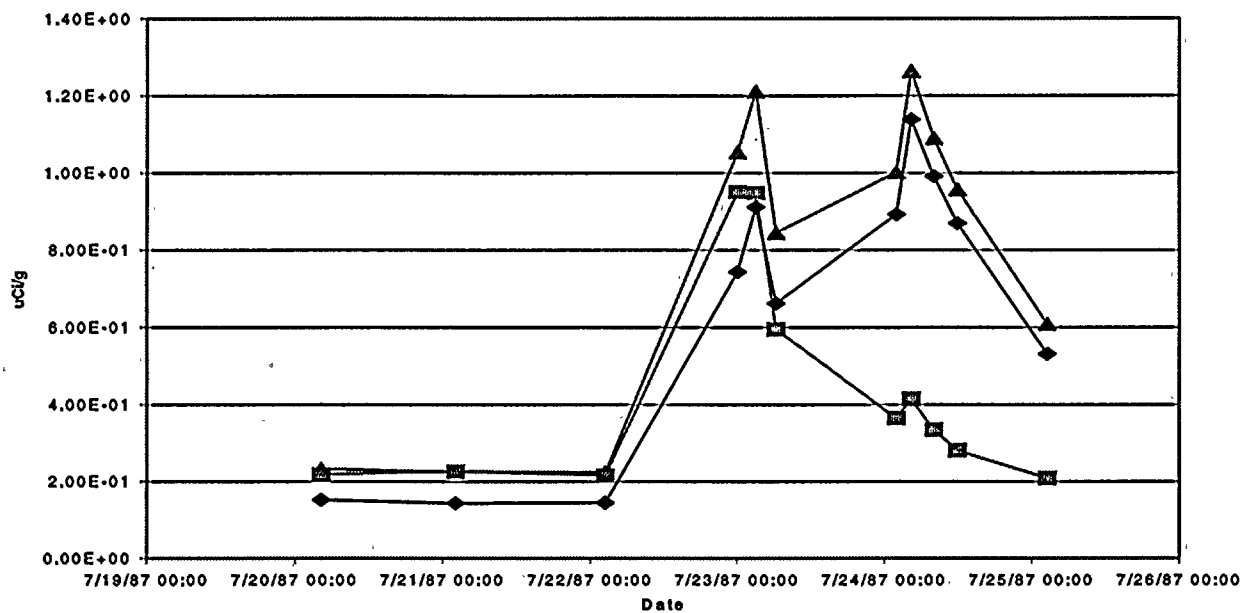
Unit One Dose Equivalent Iodine - September 1992



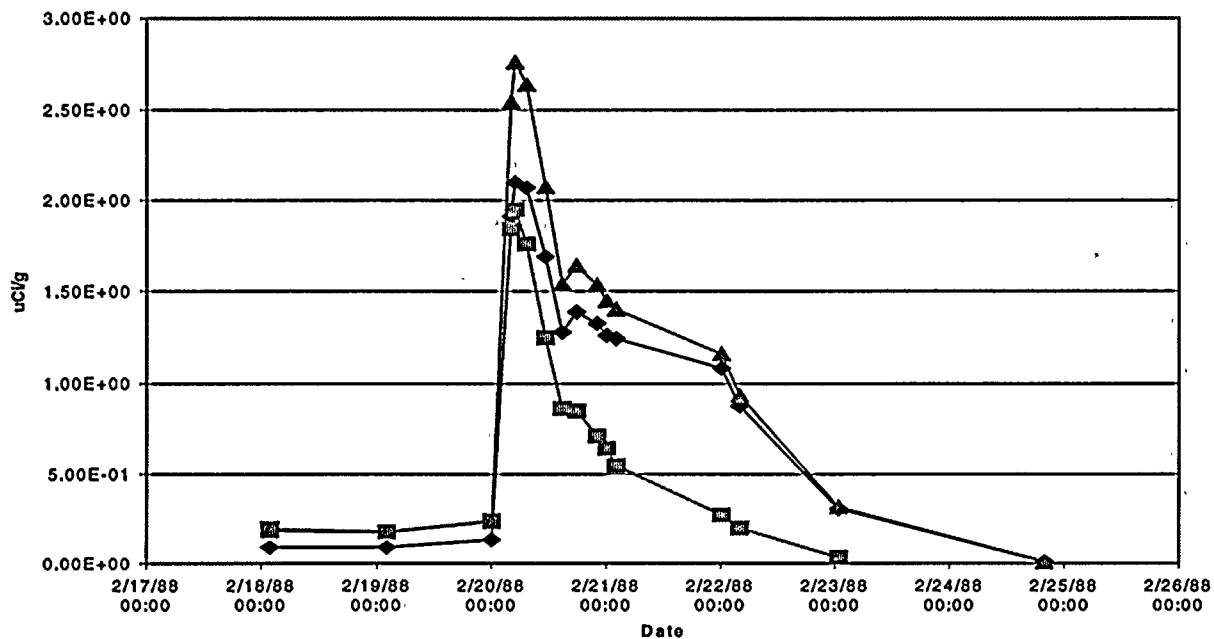
Unit Two Dose Equivalent Iodine - December 1986



Unit Two Dose Equivalent Iodine - July 1987

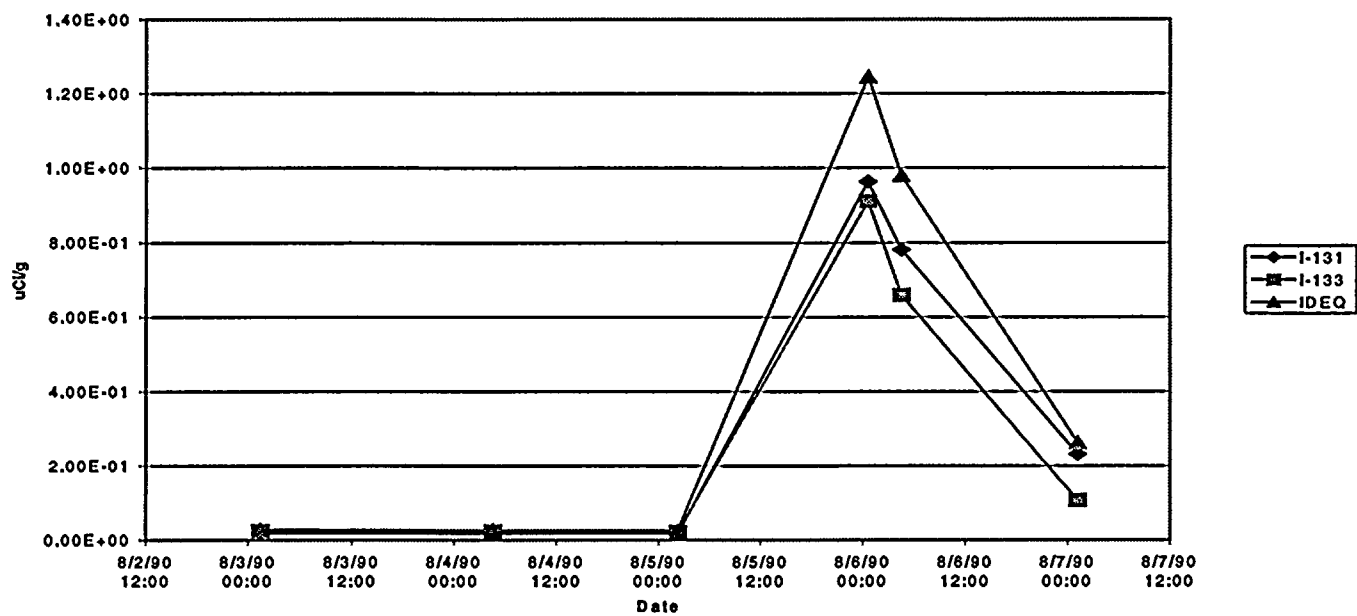


Unit Two Dose Equivalent Iodine - February 1988





Unit Three Dose Equivalent Iodine - August 1990



APPENDIX E
ODCM REV. 13

ODCM REVISION 13 SUMMARY OF CHANGES

Pages iv, 4, 34, 35, 55, 56 59, 60, 86 - Changed Table 4-16 to three separate tables, one for each Unit (Tables 4-16 for Unit 1, Table 4-17 for Unit 2, Table 4-18 for Unit 3).

Page 1 - Changed Tech Spec reference from 3/4.0 to 3.0.

Page 8 - Changed Tech Spec reference on Table 2-1, Action 41 from 3.9.12 to TRM TLCO 3.3.108.

Pages 73,75, 76 - Revised Table 6-4 locations as a result of the 1998 Land Use Census and deleted all reference to sample locations which were deleted in previous revisions to the ODCM.

Page 77 - Updated Figure 6-1 (map), sample locations.

Page 83 - Section 7.1;

1. deleted the previous due date of the ARERR (May1) to correspond to ITS 5.6.3.
2. added requirements of TRM 5.0.600.1.

Page 85 - Section 7.2;

1. changed AREOR due date to May 15 (was May 1) to correspond to ITS 5.6.2
2. added statement from ITS 5.6.2 regarding reporting collocated TLD, which was not in the previous Tech Spec.

Page 93 - Definitions;

1. deleted definition for ODCM since it does not appear in ITS definitions.
2. added definition for 'OPERABLE-OPERABILITY' since the ITS definition is only applicable for safety systems.

APPENDIX C - REVISION REQUEST FORM

DATE: 6-2-98

ORIGINATOR: Louis Drinovsky

EXT: 6955

PAGE 1 OF 2

Description and Justification of Revision:

I. INTRODUCTION

This revision to the ODCM is required due to implementation of Improved Technical Specifications (ITS) and results of the 1998 Land Use Census. Since the ITS approval process includes NRC approval (approved 5-20-98, implementation scheduled the week of 8-10-98), no additional evaluations via 10CFR50.59 are required to implement the related ODCM changes. This revision request will focus on the ODCM changes necessitated by the 1998 Land Use Census.

The Radiological Environmental Monitoring Program (REMP) is required to be performed as per the Offsite Dose Calculation Manual (ODCM). Section 6.0 of the ODCM defines the REMP. A Land Use Census is required to be performed annually per Section 6.2.1. The census is performed in accordance with 74RM-0EN07, Land Use Census, and identifies nearest residents, gardens, and milk animals.

The purpose of the census is to identify changes in local land use, which either increases the dose to a member of the public or identifies a potentially significant exposure pathway.

II. REVISION/JUSTIFICATION

Changes due to ITS implementation:

Page 1, Section 1 - reference to Technical Specification 3/4.0 is changed to 3.0 since ITS no longer includes this nomenclature.

Page 8, Table 2-1, Action 41 - Tech Spec 3.9.12 no longer exists. Reference to this requirement is now the TRM TLCO 3.3.108.

Page 83, Section 7.1 - ITS Section 5.6.3 no longer includes a requirement to submit the ARERR to the NRC by May 1 each year, so the date has been deleted. The report is required annually by 10 CFR50.36a. Added statement referencing TRM 5.0.600.1

Page 85, Section 7.2 - ITS Section 5.6.2 requires that the AREOR be submitted by May 15, which is a change from the previous requirement of May 1. Added statement regarding NRC collocated TLDs.

Page 93, Definitions

Deleted definition for 'ODCM' since it is not in ITS definitions.

Added definition for 'OPERABLE-OPERABILITY' since the ITS definition is only applicable for safety systems.



Changes due to 1998 Land Use Census (see CRDR 9-8-0818):

These changes are to be made to Table 6-4 (pages 73, 75, 76) and Figure 6-1 (page 77) of the ODCM and include the following (additionally, some editorial changes will be incorporated):

Table 6-4 (list of sample locations)

1. Replace the Payne garden (site #52, NNE2) with the Hallman garden (ESE4) as a required vegetation sample location due to its higher dose potential.
2. Replace the Hommel garden (site #65, ENE4) with the Payne garden (NNE2) as a supplemental vegetation sample location since Payne has a higher dose potential. Designate the Payne garden as site #64.

Figure 6-1 (map of sample locations)

1. Revise vegetation locations for site #52 and 64; delete site #65.

Editorial Changes

- ◇ Change the name of the resident at site #47 to Steele (was Adams) due to change in property ownership (page 75).
- ◇ Replace the location description for site #47 and #49 with the resident street address (page 75).
- ◇ Change the control vegetation location description from Tolleson Produce Co. to Rousseau Farming Co. (site #62) (page 76).
- ◇ Remove all previously deleted sample sites from Table 6-4 (pages 73-76).
- ◇ Change Table 4-16 to three separate tables (one for each Unit); Table 4-16 (Unit 1), Table 4-17 (Unit 2), Table 4-18 (Unit 3) (pages iv, 4, 34, 35, 55, 56, 59, 60, 86).

Approved by: 
Chemistry Support Department Leader

Date: 6/26/98

Use additional pages as required.



Appendix D - Technical Specification Reference

A. Periodic Review and/or Revision Requirements:

Technical Specification, Section 6.8.4.g and Section 6.8.4.h have been reviewed. The program elements required to be contained in the ODCM are present in this review/revision of the ODCM.

ODCM Revision No. 13

Initiator Name (printed) Louis Drinovsky

Signature *Louis Drinovsky* Date 6-10-98

Technical Reviewer *W. W. K* KUTNER Date 6-25-98

B. Additional Revision Requirements:

This ODCM revision submittal contains;

1. Sufficient information to support the change together with the appropriate analyses or evaluations justifying the change(s) and;
2. A determination that the change will maintain the level of radioactive effluent control required by 10CFR20.106, 40CFR Part 190, 10CFR50.36a, and Appendix I to 10CFR50 and not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.
3. Each change shall be identified by markings in the margin of the affected pages; clearly indicating the area of the page that was changed, and shall indicate the date (e.g., month/year) the change was implemented.

Initiator *Louis Drinovsky* Date 6-10-98

Technical Reviewer *W. W. K* KUTNER Date 6-25-98

10CFR50.59
SCREENING AND EVALUATION

Page 1 of 8

| | |
|---|----------------------|
| UNDER REVIEW: (NAME/TITLE)
Site Dose Calculation Manual, Section 6 | 50.59 REVISION:
0 |
| DESCRIPTION OF PROPOSED CHANGE:
Revise Table 6-4 and Figure 6-1 due to changes in sample locations as a result of the 1998 Land Use Census | |
| | |
| (continue on Response Justification Page) | |

APPLICABILITY

NO YES

- A. Is the proposed change programatically eliminated from the 10 CFR 50.59 program?
 (Reference Section 3.2)

X —

— If question A is answered "YES," a 10 CFR 50.59 Screening/Evaluation is NOT required.

X If question A is answered "NO," a 10 CFR 50.59 Screening must be performed.

10CFR50.59 SCREENING (Provide References on Response Justification Page)

NO YES

Does the proposed change:

1. Make changes in the facility as described in the Palo Verde Licensing Documents?
 (refer to Section 4.1.4 and Appendix C)

— X

NOTE: Prior to modification of radioactive waste systems, review the modification against the specific criteria in IEC 80-18 (Appendix G).

2. Make changes in procedures as described in the Palo Verde Licensing Documents?
 (refer to Section 4.1.4 and Appendix C)

— X

3. Involve tests or experiments not described in the Palo Verde Licensing Documents?
 (refer to Section 4.1.4 and Appendix C)

X —

- 3a. Is PRB approval required? (Refer to Appendix C)

X —

4. Involve a change to the technical specifications? (Refer to Appendix C)
 (Technical Specifications in this case refers to both the Current Technical Specifications and the Improved Technical Specifications)

X —

X If any answer to questions 1, 2, or 3 is "YES," then a 10 CFR 50.59 evaluation is required. When the Evaluation is completed, and prior to the review, contact Document Control at ext. 82-5439 to obtain a tracking log number and enter the number in the Evaluation Log number block above.

— If answer 1, 2, or 3 is "YES," refer to 93DP-0LC03 and determine if an LDCR is required.

If an LDCR is required, contact NRA for a tracking # and enter the number here _____

If an LDCR is not required, include justification in the response section.

— If answer 4 is "YES," then a Technical Specification Change Request per procedure 93DP-0LC03 and PRB and NRC approval is required prior to implementation. (See the procedure for an explanation of exceptions to this.)

— If all answers 1 through 4 are "NO," no 10 CFR 50.59 Evaluation is required or Technical Specification change is required, recommend action approval.

— Send a copy of this screening to NRA station 7636.

I verify that the above screening is adequate and accurate and that I am currently qualified to perform
 10 CFR 50.59 Screenings.

Louis Drinovsky 6-10-98

 DATE

JAMES M. SHAWVER 6/25/98

 50.59 REVIEWER DATE

Louis Drinovsky
 SCREENER (PRINT)

JAMES M. SHAWVER
 50.59 REVIEWER (PRINT)

10CFR50.59
SCREENING AND EVALUATION

Page 2 of 8

UNDER REVIEW: (NAME/TITLE)

Site Dose Calculation Manual, Section 6

50.59 REVISION:

0**10 CFR 50.59 EVALUATION** (Provide References on Response Justification Page)

Reference Appendix C of 93DP-OLC07 for detailed explanation of each question

| | NO | YES |
|---|----------|-----|
| 5. May the probability of an accident previously evaluated in the UFSAR be increased? | <u>X</u> | ___ |
| 6. May the consequences of an accident previously evaluated in the UFSAR be increased? | <u>X</u> | ___ |
| 7. May the probability of a malfunction of equipment important to safety be increased? | <u>X</u> | ___ |
| 8. May the consequences of a malfunction of equipment important to safety be increased? | <u>X</u> | ___ |
| 9. May the possibility of an accident of a different type than any previously evaluated in the UFSAR be created? | <u>X</u> | ___ |
| 10. May the possibility of a different type of malfunction than any previously evaluated in the UFSAR be created? | <u>X</u> | ___ |
| 11. Is the margin of safety as defined in the basis for any technical specification reduced? | <u>X</u> | ___ |

Call NFM at Ext. 82-5341 (alt 82-5092). Duty Pager 2667.

Review Requested by NFM and Completed Yes ___ No Review Requested by NFM XName of individual contacted in NFM John Valerio 6-9-98

___ If any answer to questions 5 through 11 is "YES," then an unreviewed safety question is identified. PRB and NRC approval is required prior to implementation.

X If answers 5 through 11 are all "NO," there is no unreviewed safety question and NRC approval is not required prior to implementation under 10 CFR 50.59.

___ If UFSAR Chapter 6 or 15 are potentially affected, forward a copy of evaluation to Nuclear Fuels Management.

___ Send a copy of this evaluation to NRA station 7636 and NIRM station 7714.

I verify that the above evaluation is adequate and accurate and that I am currently qualified to perform 10 CFR 50.59 Evaluations.

Louis Drinovsky 6-10-98
EVALUATOR DATE

Louis Drinovsky
EVALUATOR (PRINT)

James M. Shawver 6/25/98
50.59 REVIEWER DATE
JAMES M. SHAWVER
50.59 REVIEWER (PRINT)



10CFR50.59 SCREENING AND EVALUATION RESPONSE JUSTIFICATION

Page 3 of 8

ACTION UNDER REVIEW: (NAME/TITLE)

REVISION:

C

Site Dose Calculation Manual, Section 6

PROCEDURE/PCP/TEMPORARY MODIFICATION NO.:

| QUESTION | RESPONSE JUSTIFICATION |
|----------|---|
| | INTRODUCTION |
| | The Radiological Environmental Monitoring Program (REMP) was designed to monitor the environs near the PVNGS using the guidance of the NRC Branch Technical Position (BTP) on environmental monitoring (Rev. 1, 1979). Factors used in the program design are further delineated in the PVNGS Environmental Report - Operating License Stage (ER-OL), section 6.1. |
| | The REMP is required to be performed per the Offsite Dose Calculation Manual (ODCM). Section 6 of the ODCM defines the REMP. A Land Use Census is required to be performed annually per Section 6.2.1. The census is performed in accordance with Nuclear Administrative and Technical Manual procedure 74RM-0EN07, Land Use Census, and identifies the nearest residents, gardens, and milk animals. The purpose of the census is to identify changes in local land use which either increases the dose to a member of the public or identifies a potentially significant exposure pathway. The changes being made were due to information obtained during the performance of the 1998 census, which includes dose calculations that are the bases for making changes in monitoring locations. |
| | Changes to the ODCM do not require that a Licensing Document Change Request be submitted to Nuclear Regulatory Affairs since there is no mention of the ODCM in 93DP-0LC03, Licensing Document Maintenance. |



**10CFR50.59 SCREENING AND EVALUATION
RESPONSE JUSTIFICATION**

Page 4 of 8

ACTION UNDER REVIEW: (NAME/TITLE)

REVISION:

0

Site Dose Calculation Manual, Section 6

PROCEDURE/PCP/TEMPORARY MODIFICATION NO.:

| QUESTION | RESPONSE JUSTIFICATION |
|----------|---|
| | SUMMARY OF CHANGES: |
| | |
| | Table 6-4 |
| | |
| | 1. Replace the Payne garden (site #52, NNE2) with the Hallman garden (ESE4) as a required vegetation sample location due to its higher dose potential evidenced by dose calculation results. |
| | 2. Replace the Hommel garden (site #65, ENE4) with the Payne garden (NNE2) as a supplemental vegetation sample location since Payne has a higher dose potential as evidenced by dose calculation results. Designate the Payne garden as site #64. |
| | 3. EDITORIAL - Change the name of the resident at site #47 to Steele (was Adams) due to change in property ownership. |
| | 4. EDITORIAL - Replace the location description for site #47 and #49 with the resident street address. |
| | 5. EDITORIAL - Change the control vegetation location description from Tolleson Produce Co. to Rousseau Farming Co. (site #62) |
| | 6. EDITORIAL - Remove all previously deleted sample sites from Table 6-4. |
| | |
| | FIGURE 6-1 |
| | |
| | 1. Updated figure (map) as per location changes in Table 6-4. |
| | |
| 1 | YES The REMP is required to be performed by licensing basis documents. The ODCM is one of these licensing basis documents. A change to the ODCM, therefore, does make a change as described in a licensing basis document. |



**10CFR50.59 SCREENING AND EVALUATION
RESPONSE JUSTIFICATION**

Page 5 of 8

ACTION UNDER REVIEW: (NAME/TITLE)

REVISION:

Offsite Dose Calculation Manual, Section 6

0

PROCEDURE/PCP/TEMPORARY MODIFICATION NO.:

| QUESTION | | RESPONSE JUSTIFICATION | |
|----------|--|------------------------|--|
| 2 | | YES | The proposed changes are to the REMP section of the ODCM. The ODCM is a licensing basis document. The REMP section of the ODCM was developed using guidance from the BTP on environmental monitoring and from locations described in the ER-OL. All proposed changes are changes which could be considered licensing basis procedure changes since they describe implementation of the REMP. |
| 3 | | NO | The purpose of the change is to change offsite REMP sample locations. In this process, no tests or experiments are carried out. |
| 4 | | NO | The technical specifications require ODCM implementation (tech spec 6.8.1i., 6.8.1j., 6.8.4h.) but do not specifically describe how to perform the processes contained in the ODCM. No technical specification changes would be required as a result of the proposed changes, only changes to Nuclear Administrative and Technical Manual procedures. |
| 5 | | NO | One of the purposes of the REMP is to monitor potential significant exposure pathways to the public. This required program involves various environmental samples, analysis of samples, and evaluation of results obtained. The implementation of this program or any changes to it could not increase the probability of any accident. |
| 6 | | NO | Changes to section 6 of the ODCM could not affect the consequences of any accidents. One of the purposes of the REMP is to monitor potential significant exposure pathways to the public. This required program involves various environmental samples, analysis of samples, and evaluation of results obtained. Even though the analysis of REMP samples could be used to evaluate the results of an accident (after the fact), the consequences of an accident could |



100



**10CFR50.59 SCREENING AND EVALUATION
RESPONSE JUSTIFICATION**

Page 6 of 8

ACTION UNDER REVIEW: (NAME/TITLE)

REVISION:

Site Dose Calculation Manual, Section 6

0

PROCEDURE/PCP/TEMPORARY MODIFICATION NO.:

| QUESTION | | RESPONSE JUSTIFICATION | |
|----------|----|--|--|
| | | not be increased by the performance of any aspect of this program. | |
| 7 | NO | The REMP does not interface with any plant SSC and is performed completely outside the power block. The only equipment associated with the performance of the REMP is the environmental air sample equipment. This equipment consists of low volume vacuum pumps which continuously draw air through particulate filters and charcoal canisters. All air sample equipment is located offsite and does not interface with any plant SSC. Making changes in the REMP could not increase the probability of a malfunction of any equipment important to plant safety. | |
| 8 | NO | The REMP does not interface with any plant SSC and is performed completely outside the power block. The only equipment associated with the performance of the REMP is the environmental air sample equipment. This equipment consists of low volume vacuum pumps which continuously draw air through particulate filters and charcoal canisters. All air sample equipment is located offsite and does not interface with any plant SSC. Making changes in the REMP could not increase the consequences of a malfunction of equipment important to plant safety. | |
| 9 | NO | The REMP does not interface with any plant SSC and is performed completely outside the power block. The only equipment associated with the performance of the REMP is the environmental air sample equipment. This equipment consists of low volume vacuum pumps which continuously draw air through particulate filters and charcoal canisters. All air sample equipment is located offsite and does not interface with any plant SSC. Making changes in the REMP could not create the possibility of an accident of any type. | |



10CFR50.59 SCREENING AND EVALUATION RESPONSE JUSTIFICATION

Page 7 of 8

ACTION UNDER REVIEW: (NAME/TITLE)

REVISION:

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Site Dose Calculation Manual, Section 6

PROCEDURE/PCP/TEMPORARY MODIFICATION NO.:[illegible]

10CFR50.59 SCREENING AND EVALUATION RESPONSE JUSTIFICATION

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ACTION UNDER REVIEW: (NAME/TITLE)

REVISION:

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Site Dose Calculation Manual, Section 6

PROCEDURE/PCP/TEMPORARY MODIFICATION NO.:

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